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EST. 1775
250
U.S. ARMY
THIS WE'LL DEFEND

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A Note from History

At the time of the American Revolution, physicians could do little. Conserving health, treating the sick, performing surgery, and psychiatry – none had progressed much beyond ancient texts from Greece and Rome. Recently, European armies had developed concepts of how medical support could sustain combat strength, and those were available for the few colonial physicians, but almost nobody in the colonies had read those works. There were few physicians, and even augmented by apothecaries and others, their treatments likely did more harm than good. The exception was inoculation against smallpox, and troops sought inoculation – lack of inoculation deterred enlistment.

The troops wanted medical care. Even ineffective care sustained morale: someone cared for them, and it showed their country cared about them. Congress knew "an Hospital" could sustain strength and morale, and would help the commanders to maneuver and win. Throughout the Revolution, from the earliest campaigns to the vital battle at Yorktown, doctors tried their best. They suffered alongside patients (they had a higher death rate, doubtless due to more exposure to disease) and showed their dedication to cause and patients. Many times they failed, but not through failing to try. Here you can see the big picture and the small – campaigns, individuals, and locations. You can see the limited tools they had, the supply problems, the problematic understanding of disease and surgery. And you can see the care and humanity, the attempts to improve health through sanitation, and survival through better surgery.

In 250 years, medical knowledge has improved, alongside better equipment, and greater integration with the Army. The purpose is unchanged. Since 27 July, 1775, the Army Medical Department has been caring for soldiers to help win the nation's wars.

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"Andrew Craigie at Bunker Hill" by Roberth Thom

The British Enlightenment & Birth Of Modern Military Medicine

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INTRODUCTION

The 18th Century was the Age of Enlightenment, the Age of Reason. Also known as the long 18th Century, from the Glorious Revolution to Napoleon's defeat at Waterloo, (1689-1815), it was an era of almost continual warfare for Britain on the European and North American continents. These wars and British Enlightenment thought significantly altered military and naval medicine. Some line officers, in conjunction with the medical men in their command, worked to reconcile current traditions and the needs of the service with a more humanitarian command approach toward soldiers. This essay will explore British Enlightenment thought, the birth of military medicine in the post-War of Austrian Succession and post-Seven Years War publications of a handful of physicians and surgeons, and the impact they made on military medicine during the American War for Independence.

The Enlightenment has been described as the "most profound intellectual, social, and cultural transformation of the Western world since the Middle Ages and the most formative in shaping modernity."[1, 3] Reasoned analysis and critique of traditional institutions was a hallmark of the Enlightenment. The concerns and judgements of British philosophers and scientific theorists, such as Locke, Newton, Shaftsbury, Defoe, Sydenham, Berkeley, and others, significantly influenced the initiation and progress of that movement.[2, 1-18] It unfolded with a strong moral philosophical foundation, a skepticism of past assumptions and ideas, an appreciation of empirically-derived knowledge, and a pragmatic, thoughtfully critical, common sense approach to conflicting ideas and how those ideas influenced the experiences of daily life. [1, 5] It has been suggested that the British Enlightenment would be more accurately described as "enlightenments,"[3] which occurred in social clubs, coffeehouses, and pubs, and on streets of cities and towns across England, Scotland, Wales, and Ireland. In these venues a diverse cross-section of British society debated religious, political, economic, social, and cultural issues, and sorted conflicting opinions and convictions. The result was a broad and deep epistemological change in British society over the long 18th Century. The result was a more tolerant public with a greater moral sense, a heightened humanitarian consciousness, and desire to improve the conditions of society at all levels. [3, 4,1, 5]

The impact of Enlightenment thought on European military establishments has been, and continues to be, studied with interest.[6-18] These studies have revealed not only the technological, administrative, and logistical advancements that significantly changed the nature of warfare through the 18th Century, but also the concomitant responsibility, indeed the necessity, of commanders to maintain individual soldiers as they would horses, weapons, and wagons. The complexity of military organization and operations increased with these advancements. It demanded that officers demonstrate more foresight and sound judgment, indeed be better educated, than their predecessors. Educating officers proved difficult. They came largely from nobility and considered military commissions a class privilege and tha. battlefield success was based on innate genius rather than skill proved difficult. Furthermore, neither the inculcation of soldier health and welfare into an officer's responsibilities nor the integration of those ideas with the needs of the service appear to have been intuitive to 18th Century military thinking. These issues confronted all major European armies of that era and would require the entirety of the long 18th Century just to establish a foundation for their resolution.

Within the British military establishment, a small, but perceptible, epistemological shift in line officer awareness of, and accommodating practices for, these issues can be appreciated in the early Enlightenment. These evolving concepts would become more tangible in officer publications following the War of the Austrian Succession (1742-1748) and the Seven Years War (1756-1763).

MILITARY ENLIGHTENMENT

As political, social, religious, and economic institutions were scrutinized through reasoned analysis, traditional military organizations and operations were likewise examined for hindrances to their effectiveness.[18, 8] By the turn of the 18th Century, the spike bayonet had put pikemen out of business, the musket made lighter, the wheel lock had given way to the flintlock, and wooden ramrods had been replaced by iron. These advancements tripled the rate of infantry fire now delivered in massed volleys. Cannon became lighter and more maneuverable as well. All these changes increased battlefield casualties.

During the War of the Spanish Succession (1702-1714), Sir John Churchill, First Duke of Marlborough, organized and employed his infantry, cavalry, and artillery in a coordinated fashion on battlefields selected for geographical advantage, what later generations would call tactical mobility. Technological changes, noted above, complicated battlefield movements and logistical support on campaign. They also increased the value of the individual soldier, vis-a vis the time and money required to train him for these more complex duties. Humanizing the soldier, fostering self-motivation and self-reliance with less dependence on traditional harsh discipline, may have been for the improvement of military effectiveness and efficiency rather than for the sake of the soldier. It had, nevertheless, entered the realm of military thought.[18, 9]

Marlborough was also extremely interested in the health of his army and actively involved in establishing tactical and strategic medical services. During his 1704 campaign, which ended with the Battle of Blenheim, Marlborough dispatched his Flying Hospitals by boat up the Rhine and Main rivers, leaving small hospital detachments along his lines of communication prior to battle. Once casualties were treated at Regimental or Field Hospital level they were sent back along this line to Nijmegen in Holland where they were separated. minimal care wounded were sent to the hospital at Dort and those requiring longer care to hospitals in Ghent. When able to travel, these patients returned to Portsmouth and then London if more care was needed. Marlborough spared no expense on medical services and was involved in placing his hospitals, ensuring proper organization, and regularly reviewing the rolls of sick and wounded.[10,18] Marlborough's command style was emulated by future combat commanders, Second Earl Stair, Sir John Dalrymple, Field Marshal Sir John Ligonier, Sir John Manners, Marquis of Granby, and Generals Sir Jeffrey Amherst, and James Wolfe. Regrettably, and except for General Amherst, none of these men put their garrison and campaign experiences into print. The primary fare for early- to mid-Enlightenment military readers resided in the experiences of mid- to late-17th Century Continental commanders, such as Raimondo Montecuccoli, Henri de Turenne, and the Marquis de Puységur, and those of mid-Enlightenment military theorists Maurice de Saxe, Turpin de Crisse, Paul de Maizeroy, and the Comte de Guibert.[19, Preface]

"From the great Reputation of the British Arms," wrote Lieutenant Colonel Henry Bland in 1727, "Men would be apt to Imagine, that several Treatises, of the Art of War, were to be met with in our Language; but … they will be strangely surprized to find nothing of this Kind of our Native Growth … except what has been left by the Earl of Orrery, who wrote fifty years ago."[19, 20] However, Bland commented that the book would be of little value due to improvements in the military art, and, therefore, he was putting his experience into print for young officers.[19]

MEDICAL ENLIGHTENMENT

At the turn of the 18th Century there was no military medical establishment as is understood today. Medical services to the military establishment existed only while on campaign. Military physicians and surgeons did not take part in campaign planning, they had no officer's commission, no military rank, and remained essentially civilians in temporary service to the government. Physicians were paid more than surgeons, even the Master Surgeon of a stationary hospital. The Regimental Surgeon was a warrant officer with no medical degree, who was poorly paid, had only a minimum of technical control over his activities, was subject to corporal punishment, and owed loyalty to the regimental colonel. However, even without a medical degree, he performed the duties of physician often on campaign and during winter quartering of the regiment.

In the aftermath of the War of the Austrian Succession, a few physicians and surgeons, who had served in the British Army and Royal Navy, put their campaign, garrison, and shipboard medical and surgical experiences into print. George Cleghorn published *Observations on the epidemical diseases in Minorca* (1751),[21] John (later Sir John) Pringle, MD published *Observations on the Diseases of the Army* (1752),[22] Francis Home, MD published *Medical Facts and Experiments* (1759),[23] and James Lind published *An Essay on the Most Effectual Means of preserving the Health of Seamen* (1757, 1762).[24]

These military and naval practitioners were not the first to record such experiences or recognize the unique nature of military occupation.[25, 26, 27] However, they were the first to 1) define and describe the disease risks of soldiers in detail, 2) relate these risks to military activities and the environment in which they were conducted, and 3) organize and present their observations, therapy, experiments, and opinions of military medical issues in a manner relevant to civilian and military medical and surgical audiences.[28]

Pringle took copious clinical notes during his six years at war on the Continent. Before he composed *Observations*, he reviewed ancient and modern historians and concluded that the 'diseases of the army have … been treated by none of the ancients … nor has this deficiency been supplied … by any of the moderns unless such as either were little or not at all employed in the service [and therefore, military medicine was] still in a manner new."[29,]

His empirical observations and experiences validated those comments in three sections which presented the 1) diseases in the operational area and diseases of garrison and campaign, 2) diseases common to an army, influence of seasons upon them, and modes of prevention, and 3) a presentation of fevers, dysenteries, their symptoms, treatments, and prognostics in a military context. That is, endemic and epidemic

diseases encountered by soldiers were impacted by geography, weather, embarkation, marches, temporary camps, and fixed quarters. Pringle also provided preventive modalities. These, he made clear, were the commander's responsibilities for soldier health with advice from their serving physicians and surgeons. But he did not exempt soldiers from responsibility for their health. "The prevention of diseases cannot consist in the use of medicines or depend upon anything a soldier shall have it in his power to neglect," wrote Pringle, "but upon such orders as shall not appear unreasonable to him, and such as he must necessarily obey."[29]

Pringle gave military medicine substance, method, and validity at all levels of command, and these were appreciated by military physicians in Britain and on the Continent. *Observations* also won immediate acclaim among civilian physicians in Britain for its discussion and therapeutic recommendations concerning malignant (typhus) fever. Each of the six English editions that followed were eagerly awaited and foreign editions appeared in 1754 (German), 1755 (French), and 1762 (Italian).[28]

Francis Home, who served as surgeon to Sir John Cope's Regiment of Dragoons,[30] appears to have been motivated by the work of Pringle, and possibly Cleghorn, to recount his wartime medical experiences. To maintain originality, he noted that the cases he described were not to be found in Pringle's "*Observations*", and that his cases contained "something singular in the symptoms or in the cure."[23] Likewise, in Part I, Section III, Home included 'Regimental Orders' for the specific prevention of remittent fever, rather than general preventive methods as discussed by Pringle. Interestingly too, he disregarded Pringle's mandate that disease prevention cannot be left to soldier discretion, but rather upon commander's orders by stating that in remittent fever "every man's own reflexion will furnish him with other particular rules to remove dampness from clothes and tent and maintain a proper diet."[29,23, 58]

The Seven Years War made all three publications quite timely, although it is likely that *Medical Facts and Experiments* had less of an impact as it was published during the war. The "*Observations*" of Cleghorn and Pringle became field manuals for many British medical officers, such as Richard Huck, Richard Brocklesby, and Donald Monro, on the European and North American continents. Indeed, Pringle's ideas received their baptism by fire during that war and immediate assessment upon cessation of hostilities.

In the aftermath of the Seven Years War, Brocklesby[31] and Monro[32] put their wartime experiences into print. Both men followed Pringle's lead concerning the role of commanders in disease prevention and soldier health. However, unlike Pringle, who served at the highest command and medical echelons, they observed military and medical operations at the regimental level.

Brocklesby's "*Observations*" are in two parts. Part I, addressed to field officers and regimental surgeons, is an astute commentary and critique on the organization and operation of military medical services, integration of those services and physicians into regimental life on and off the battlefield, and the health care responsibilities of those in command. Although he admired Pringle's work, Brocklesby thought it was too erudite for the average military officer to obtain any benefit from it, and, therefore, he prepared a treatise "merely popular, or in a good degree comprehensible to readers of every capacity."[31, 5, 2,7] Part II is a review of military diseases encountered in Great Britain, 1758-1763.

Brocklesby's personal experience with officers in the 72nd Regiment of Foot concerning troop health care had been very good. He stated unequivocally that when regimental field officers – Colonels, Lieutenant Colonels, and Majors – perform their duties with care and attention to detail, most diseases common to soldiers are avoided. However, these tasks could not be accomplished with soldiers "scattered up and down the alehouses of a great town,"[31, 20] as was the common practice. Only in barracks could officers, in conjunction with a medical officer, ensure that preventive health discipline, such as cleanliness, ventilation and airing of bedclothes, messing together, and sobriety, was taught and enforced.[31] Military hospitals, he noted, were not mentioned by current military authors mainly because they were not trained, nor had interest, in establishing a system for their function and integration into military operations. Although it was becoming more common after the War of the Austrian Succession to have physicians assigned as hospital directors, they were often laymen, that is, military officers.[33] Brocklesby's solution to this situation was to have not only the most mature and experienced army physicians as hospital directors, but also ones that had a "military character." These men would be given complete authority for hospital operations.[31] At the regimental level Brocklesby considered the physician or surgeon as the most important officer after the colonel, lieutenant colonel, and major.[31] But, as noted above, this was a radical idea for the 18th Century military establishment to grasp.

Brocklesby contended that medical, not surgical, considerations and actions, made up the lion's share of the work for military practitioners even in wartime.[31] Moreover, he was adamant that physicians, not surgeons, should examine and judge the competency of physicians, surgeons, and surgeon's mates who applied for the service.[31] The Hospital Board, established in 1756 by the Secretary at War, Lord Viscount Barrington, at the behest of His Royal Highness, the Duke of Cumberland, consisted of army hospital physicians, the Surgeon General, the Principal Surgeon, and Hospital Purveyor. That Board was the sole body examining and approving physicians, hospital mates, hospital surgeons and their mates. As the Seven Years War progressed on the

European and North American Continents, a new commission, Inspector of Regimental Infirmaries, was created. Over time, it subsumed the role of the Hospital Board.[31]

Brocklesby stated he did not mean to "exhibit the least appearance of petulant malevolence against any set of Gentlemen"[31, 34] when he unleashed his most severe criticism on this topic. He could not "be quite so fashionably complaisant to admit that any of the best [line officers], or even any Court of Examining Surgeons … are competent judges of medical subjects, sufficiently to ascertain, what are the requisite physical qualifications of men, who presume to superintend the lives and health of 900 soldiers … usually committed to each regimental practitioner."[31] The cunning deception of some doctors over the ignorant leads "many in civil, as well as military life, [into] a deluded belief, that there is but little difference between the genuine Physician, and the manual, cutting, or operating Surgeon, as to their importance to the army, and their knowledge in curing diseases.([31]) Brocklesby concluded by stating that the education of surgeons showed an "absolute neglect of a liberal education in the generality of Surgeons, are all together apt among them to induce Quackery, or, at best, a narrowness in thinking about medical subjects, and an absence of the comprehensive, and universal knowledge, as well as of that ingenuous cast of temper, which … is requisite to complete a Physician … Every person who knows that Surgery is but a small part of the study of Physick, that it only teaches the cure of external diseases, such as properly require the knife, or plaister … will easily grant, that a mere Surgeon ought not, with any justice to the patient, to attempt the practice of physick."[31] Brocklesby admitted he was referring to surgeons in general and provided some notable exceptions.[31] However, he reminded readers that the poor education of army surgeons on the European and North American Continents during the Seven Years War "exposed the service to manifold inconveniences and numberless scenes of confusion.[31]

Brocklesby also proposed that if the army desired to have the best physicians and surgeons, then their pay would have to be commensurate with their competency. He also suggested an annuity system, paid into by the regiment which would pay a specified amount over time to the physician or surgeon during wartime and peace.[31] "I am persuaded,' he wrote, "every regiment would save, even in time of peace, the suggested additional expence, only by the number of men's lives annually preserved in the army, and by the prevention of a great part of that charge which always attends the enlisting of new men."[31]

The dearth of qualified practitioners not only led to poor medical care, but also to the poor establishment and administration of military hospitals, both general and regimental. Brocklesby's thoughts on military hospitals were the same as on barracks: they had to be clean, well-ventilated, orderly, and disciplined. Hospitals were medical barracks, medical barracks that required re-location depending on the vagaries of war. Frequently established too far from the scene of action in cottages, barns, and small outbuildings, military hospitals in all countries, according to Brocklesby, were filthy places, resistant to all methods of purification, and, therefore, merely dens of infectious disease.[31]

In October 1758, Brocklesby was serving in the military hospital in Newport on the Isle of Wight. Transport ships from the Continent brought in an overwhelming number of sick soldiers. They filled the hospital and every house, barn, and unoccupied shelter to be found on the island. To contend with this problem, some clever fellows in the hospital built a temporary structure of light wooden pine boards thatched with thick new straw and spacious enough to hold 120 patients. Although Brocklesby remarked that the "hovel was finished in a fashion the most slovenly, and apparently inadequate to the end proposed,[31] the exposure to cold and moisture, notwithstanding, fewer died than in the warmer, cramped quarters in Newport. Spacious, poorly constructed sheds, continually ventilated with fresh air, were obviously key to preventing and recovering from infectious diseases. Brocklesby had opportunities to repeat this experiment at regimental infirmaries in 1760 and 1761. And he found that less capacious temporary "hovels," using other building materials proved equally effective, more comfortable, and less expensive.[31]

Donald Monro's *An Account of the Diseases which were most frequent in the British Military Hospitals in Germany, From January 1761 to the Return of the Troops to England in March 1763. To which is added, An Essay on the Means of Preserving the Health of Soldiers, and conducting Military Hospitals*, is a much less laborious contribution to military medicine than the title suggests. Unsurprisingly, Monro's disease experience and the pharmaceuticals recommended are like those of Cleghorn, Pringle, Home, and Brocklesby and reflect the medical wisdom of the era.

The *Essay*, written in two parts, is a vade mecum for the 18th Century military medical practitioner. The first part, *Means of Preserving the Health of Soldiers*, addresses all of the potential threats to soldiers in that era. clean neat quarters in barracks and in the field, the dangers of a cold, moist environment, how to preclude it, clothing during winter encampments, treatment of cold injuries, privy placement and management, soldier health aboard transport ships that included diet, exercise, airing bedclothes, using the Hales ventilator for air exchange, and removing dampness below decks, and an appropriate winter diet to preclude scurvy. Monro drew largely on his own experiences, however, his quotations, at times lengthy, from the writings of Pringle, Lind, Ramazini, Hildanus, and others provided broader validation to his commentary.

The second part of the *Essay* is, unquestionably, the most important part of Monro's book. For the first time in any military medical literature, the organization and management

of military hospitals, the educational requirements and command responsibilities of military physicians, surgeons, and apothecaries, and the duties of nurses, mates, and patients were addressed comprehensively.

Like Brocklesby, Monro advocated the passage of examinations by the College of Physicians, Surgeons Hall, or Apothecaries Hall for those entering the service in those fields. Moreover, he believed during such examinations the Physician General to the Army should be a member of the Censors of the College.[32]

Physician's and Surgeon's Mates should also be examined in surgery and pharmacy "as the Service commonly requires their acting in both Branches."[32] Indeed, the mates compounded the daily medicines, kept a log of patients, their disorders, medications ordered and given, followed up on nurse distribution of medicines, bled patients when required, and dressed non-surgical sores.[32]

In an era in which line officers had control of military hospitals, Monro wrote, "The Direction of all Military Hospitals ought always to be committed to the Physicians, who have the immediate Care of the Hospitals."[32] When an Army is deployed with multiple hospitals in various locations, the "Physician who attends the Commander in Chief ought to be made Physician General and Director of the Hospitals" with appropriate authority and responsibilities and "all Orders from Head Quarters ought to go immediately thro' this channel."[32] Physicians in the outlying hospitals should direct, that is, command, their facilities and maintain regular communications with the Physician General.

Monro advocated the establishment of rank for all commissioned hospital officers – physicians, surgeons, apothecaries as it would permit "greater Order, and more Advantage to the Sick." And he believed physicians and surgeons should be included in the Court-Martial of convalescent soldiers, although this may have been more of a disposition board rather than a judicial proceeding.[32] He also recognized that to entrust any hospital officer with the duties of Purveyor or Commissary was too great a temptation for the accumulation of wealth which had, historically, caused great abuses in all services. Therefore, he stated, "neither the Physician General, nor any of the Physicians or Surgeons of the Army, or any other Person concerned with the Direction of the Military Hospitals, ought ever to act as Purveyor or Commissary; nor ought they ever to have any Thing to do with the Accounts, Contracts, or any other Money Affairs relating to the Hospital."[32] If any officers were found engaged in such activity they were to be dismissed from service.

Monro described the command and control of military hospitals and the patients within them in detail. A daily guard mount should be conducted by the Sergeant of the Guard with sentinels placed at all entrances to the hospital to 1) control visitation, 2) ensure patients did not leave the hospital without permission, and 3) prevent "spiritous Liquors, or other Things of that Kind" being brought onto the wards.[32] The Sergeant of the Guard's duties also included morning and evening roll call rounds with the Ward Master, ensuring none but patients and staff were in house when the doors were closed for the night, and reporting roll call absentees every morning to the physician, surgeon, or apothecary and the condition of the wards.[32]

All large military hospitals should have a head nurse and sufficient nursing staff. And Monro advocated the posting of orders, or rules, of conduct for the hospital to show "Nurses and Patients what their Duty is, and to maintain Regularity and good Order through the whole Hospital.[32]

The Matron, or Head Nurse, conducted twice daily ward inspections to ensure that her staff kept the wards clean, behaved themselves "soberly and regularly,"[32] attended their patients appropriately, examined the content and preparation of patient's meals, and reported any discrepancies to the physician, surgeon, or apothecary.

The duties of the Common Nurses, and consequences of failing them, numbered seven and were quite explicit. They were to 1) keep their patients clean and fed, ensure medicines were taken as ordered, and report patient infractions, 2) keep the wards clean and well-ventilated, procure necessary provisions from the Steward's Room, obey the Head Nurse, and carry out the orders of the physician, surgeon, or apothecary punctually, 3) keep themselves "clean and decently dressed, and … observe the strictest Rules of Sobriety" or be discharged, 4) remain at their hospital duties until properly relieved, 5) empty and wash chamber pots and close-stools as soon as used and not "throw Nastiness of any Kind out the Windows," 6) ensure the patient's diet contains only what was ordered by the physician or surgeon. If liquor or edible contraband was found in a nurse's possession she was to be discharged. And 7), the last posted order for common nurses stated that those guilty of neglecting their duty, drunkenness, mistreatment and stealing from patients, alive or dead, would be "immediately sent to the Guard, and reported to the Commanding Officer …that they may be tried by a Court-Martial, and be confined, whipped, or otherwise punished, as the military Law directs; all Followers of Armies on foreign service being equally subject to the military Law as the Soldiers themselves."[32]

Upon entering the hospital, patients were to be bathed, their hair combed; to be shaved and given clean linen twice a week or more often if required. They were under orders to remain in hospital unless given leave, follow the directives of the medical and nursing staff, remain sober, and conduct themselves appropriately. Failure to follow these instructions would result in confinement and Courts-Martial.[32]

Monro also addressed the requirements and direction of convalescent hospitals, and the importance of clear communication with the Military Inspector in returning men to duty.[32] He also proved comments on appropriate types of wagons and stores for a Flying Hospital. When troops are sent on an expedition a hospital ship and officer's hospital ship should be properly provisioned before departure. Armed tenders loaded with provisions, necessaries, tents, and materials for constructing Brocklesby's "hovels" for lodging the sick and wounded upon landing should also accompany such an expedition.[32]

John Pringle, Richard Brocklesby, Donald Monro, and James Lind established military and naval medicine as academic disciplines before the North American British Colonies rebellion erupted into revolution along the Concord to Lexington Road on 19 April 1775. A number of British colonial physicians – James Lloyd, John Redman, Benjamin Rush, Benjamin Church, John Morgan, William Shippen, James Craik, Jonathan Potts – had been educated in Edinburgh and/or London. They brought the latest British literature and techniques on medicine and surgery back home where it was taught at the medical school in Philadelphia and to medical/surgical apprentices, such as brothers Joseph and John Warren, William Eustis, and Samuel Adams, Jr., albeit predominantly in urban areas. Moreover, some of them, such as Morgan, Craik, John Jones, Ammi Cutter, and many apprentice-trained doctors, put their training into practice during their service in the French and Indian War. However, a didactic and clinical training dichotomy existed between the urban medical/surgical apprentices and those educated in rural areas.

As will be seen in the following articles, it was neither the quality of practitioner, nor ignorance of British military medical establishment organization that plagued the Continental Hospital Department during the war.

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Civilian and Military Medicine at the time of the American Revolution

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CIVILIAN MEDICINE

The earliest American doctors to arrive from Europe were probably a small number of English physicians who came to the first settlements. In Virginia, there were perhaps only three or four such doctors in residence before 1700 and, over the next century, only one in nine of Virginia's medical practitioners had received any formal training. Most common in these early years were "ship's surgeons" and others who might have had informal apprenticeships, and hospital experience outside America.[1] The British occupational distinction in the hierarchy of physicians, surgeons, and apothecaries was blurred in the colonies with physicians performing surgery and dispensing drugs.[2]

Historian Philip Cash describes the emergence of five classes of medical men, the great majority receiving their training under the apprenticeship system. This method, dating back to Hippocrates, was apparently well suited to the American colonies where, until later in the colonial period, there were no medical societies and schools. However, apprenticeships were not properly regulated. All too often the medical teaching was of poor quality and there was no guarantee that the pupil would attend long enough to master even the simplest skills.[3,4]

There was public scepticism regarding the products of such an uneven training regimen, it being commonly believed that "occasionally nature gets the better of the doctor and the patient recovers".[5] This was fertile ground for the unscrupulous, an observer in 1750 noting that "[q]uacks abound [here] like locusts in Egypt". Thomas Jefferson weighed in against the "inexperienced and presumptuous band of medical tyros let loose upon the world".[6]

The first American institution recognisable as a modern hospital was the "Pennsylvania Hospital" founded in Philadelphia in 1751; a similar facility was opened in New York in 1771.[1] Both provided valuable training opportunities. The 130-bed Philadelphia Hospital has been described as "excellent" and it must be judged in the context of atrocious general hospitals in Europe.[3] John Adams toured the hospital in 1774. He was not impressed:

> *"We saw, in the lower Room under Ground, the Cells of Lunatics, a Number of them, some furious, some merry, some Melancholy…We then went into the Sick rooms which are very long, large Walks with rows of Beds on each side, and the lame and sick upon them – a dreadful Scene of human Wretchedness. The Weakness and Languor, the Distress and Misery, of these objects is a truly Woeful sight."*

Between 1753 and 1772, approximately 12% of the patients died, a figure roughly equivalent to the mortality in British civilian hospitals of the era.[7]

At least hospitals were being opened and there was a developing expertise in American medicine on the eve of the War with Britain. Of the 3,500 legitimate medical practitioners in the thirteen colonies in 1775, 400 had medical degrees.[5] In America, these were conferred by King's College in New York and the College of Philadelphia.[1] Some travelled to long-established European medical schools, especially Edinburgh where 200 Americans had attended by the end of the 18th Century.[4,5,8] There were wider gains in regulation, education, and in the exchange of ideas. Medical courses were more accessible, as were European textbooks and journals. More autopsies were performed.

Many American doctors carried the torch of Revolution. Twenty-one physicians were members of the First Provincial Congress of Massachusetts, and 1,400 doctors volunteered for the rebel army and navy.[8] The great patriot, physician and army doctor Benjamin Rush captured the mood at Lexington; "The first gun that was fired at an American cut the cord that tied the two countries together".[9]

Unsurprisingly, colonial medicine had much in common with the British system where the medical profession was divided into three parts – the physicians, surgeons, and apothecaries. British physicians were the elite, usually having a university degree and often restricting their attendance to the upper classes. Surgeons were trained by apprenticeship, their main role being to give first aid in emergencies. Their status was low. Apothecaries were also seen as being inferior to the physicians. An apprenticeship authorised them to sell and prescribe drugs.[1,10] At the time of the Revolution, there were more than 4,000 medical men resident in England and Wales. Outside London and its environs, there was little regulatory control and, as in America, many provincial "medical practitioners" lacked any legal title to practice either medicine or surgery.[10]

DISEASE IN CIVILIAN LIFE

Martha Washington knew from personal experience that "sickness is to be expected". When puritan minister Cotton Mather of Massachusetts died in 1728, he was survived by only two of his fifteen children.[6] This was not exceptional. More than 85% of babies in South Carolina died before reaching the age of two.[11] By the 1780s in Philadelphia, it was still the case that 50% of all deaths occurred under the age of ten years. The most dangerous decades were the first, the third and fourth. Americans surviving their tenth year had a relatively good outlook until they reached their twenties when tuberculosis and other respiratory disorders diminished their lives.[1]

British slum dwellers were no better off. A typical Massachusetts man aged 20 years could expect another thirty-four years, six years more than his London cousin.[1,12] Women had shorter average lives than men, debilitated by complicated pregnancies and childbirth.[6] The wealthy on both sides of the Atlantic with their better nutrition and medical care might live longer but they were not spared life's fragility.

The celebrated British naval physician James Lind defined "fever" as "an indisposition of the body attended commonly with an increase of its heat".[13] At the time of the Revolution, "fever" was regarded as being a disease rather than a symptom. It perhaps caused as many as 80% of all deaths and the battle against it has been compared with the modern-day fight against cancer.[3,14] Early clinicians classified fever according to its periodicity. There were "intermittent" fevers characterised by paroxysms and complete remissions, "remittent" fevers with less respite, and "continuous" fevers.[14] We can extract modern disease entities from this contemporary nomenclature. Most simplistically, "intermittent" (or "intermitting") fevers were commonly malaria whilst "continuous" fevers in a specific location (e.g. jail or hospital) were often typhus, or possibly typhoid.

In civilian America, epidemics of yellow fever, smallpox and diphtheria were much feared but colonial health was most affected by the relentless attrition caused by dysentery, malaria, and chest infections. There were geographical variations. Typhus was largely limited to port cities and typhoid to the northern settlements. Measles, whooping cough and mumps were prevalent but not great causes of death. In contrast, American Indian communities were exceptionally vulnerable to smallpox and influenza with very high mortality rates.[5]

Most medical men, soldiers and civilians believed the diseases that stalked them to be caused by "miasma" or "miasmata", invisible poisons which leached out of rotting organic matter, the soil, and standing water.[15] Not all were convinced, and the nebulous concept of "contagion" was gaining ground. Benjamin Franklin, who took an enlightened interest in medicine, wrote to Benjamin Rush in 1773.

> *I have long been satisfy'd from Observations, that besides the general Colds now termed Influenza's, which may possibly be spread by Contagion as well as by a particular Quality of Air, People often catch Cold from one another when shut up together in small close Rooms, Coaches, &c. and when sitting near and conversing so as to breath in each other's Transpiration.*[6]

Unfortunately, this observational, or "scientific" approach to medicine was not shared by many medical practitioners and efforts to treat disease were hamstrung by persisting medical theories of antiquity. In the mid-eighteenth Century, it was still widely believed that the state of disease was a disturbance in the balance of the body's humors (phlegm, blood, black bile, yellow bile). This perceived disequilibrium provided the rationale for the widely used "anti-inflammatory" or "antiphlogistic" regimens. In vain attempts to restore health, the hapless patient was bled by the lancet or other means, purged with drugs designed to cause diarrhoea, made sick with emetics, and given agents which induced sweating and salivation.[15] Changes in diet and vegetable-based drugs were mostly harmless but minerals such as mercury and antimony caused unpleasant side-effects. "Biologicals" included insect parts and excreta and presumably owed their curative reputation to their repulsiveness.[1] Many of these agents were listed in the *Lititz Pharmacopeia* of 1778, the first formulary published in America.[16]

Even Franklin and more forward-thinking Americans such as George Washington and Abigail Adams recommended bleeding and blistering for their sick family members.[6] Rush supported the use of emetics, laxatives and blisters.[17] These interventions very likely had a substantial placebo effect.

Whereas effective treatments were held back by entrenched and antiquated theories, there were advances in the prevention of disease. European authors observed that the greatest loss of life was in the children of the poor and improvements in infant hygiene led to a gradual fall in mortality in the years after 1750.[1]

Vaccination for smallpox using cowpox was not given before the end of the 18th Century, but inoculation was already well known in Europe. It was probably first used in the American colonies in Boston in 1721. The procedure involved the deliberate inoculation of the live *variola* virus into an incision in the arm or hand. This was preceded by a miserable, and in retrospect unnecessary, dietary regimen. A mild case of smallpox ensued, and this conferred life-long immunity. Mortality rates following inoculation were much lower than those encountered in severe smallpox epidemics;

during the Boston outbreak, only 2% of inoculated citizens died.[18] Adverse public reaction to inoculation was less due to any objection to its safety and efficacy, and more to its expense and its privileged use by the wealthy. It has been recently argued that the radical stance taken by the common people – including rioting and the burning of an inoculation hospital – had wider implications for their attitude to the British and independence. For many Americans, liberty and health were now inter-related goals.[19]

SURGERY IN CIVILIAN LIFE

The British surgeon Benjamin Gooch in his surgical textbook of 1767 outlines the reasonable expectations of the patient. The surgeon, according to Gooch, should;

> *pronounce whether the patient wou'd recover or not; whether the cure would be easy or difficult; if it would prove a short or tedious work; if it would be a perfect or imperfect cure; in which condition he [the patient] might be afterwards.*[20]

From accounts of civilian surgery of the period, it seems that such standards were exceptional. The absence of anaesthesia, antisepsis, blood transfusion, and antibiotics meant that most civilian surgeons limited themselves to more minor interventions such as the treatment of cuts, abscesses, burns, dislocated joints, and simple fractures. Antiphlogistic measures such as bleeding and purging might be used.[7,21,22]

In America, surgical skill was a rarity, but a few better trained surgeons did attempt more invasive operations. These included trephination (trepanning), amputation, the management of hernias and hydrocoeles, and lithotomy (the removal of bladder and kidney stones).

The most experienced had often received at least some of their education in Europe. John Jones was born into a medical family in Long Island, New York in 1729. After a local medical apprenticeship under the supervision of his uncle, Jones attended lectures in London and elsewhere in Europe, obtaining his degree of Doctor of Medicine at the University of Reims. He later served in the French and Indian War. The first lithotomist in New York, Jones was remarkably dexterous, able to remove a stone in less than three minutes.[23] At the outset of the Revolution, he was lecturing at the newly founded New York medical school where he was a fierce advocate of his speciality.

> *If the science of surgery, then, requires genius, knowledge and indefatigable application to render its Professors truly respectable, what must we think of the insolence and malevolence of those who represent it as a low mechanical art, which might be taught by butchers in a fortnight.*[24]

Jones' most valuable contribution was his *Plain Concise Practical Remarks on the Treatment of Wounds and Fractures* of 1775. It has claim to be the first surgical text to be published in the New World and it was the only medical book widely available to the surgeons of the fledgeling Continental Army. The author clearly intended his work to be used in the looming struggle – which he described as the "unnatural contest" – as he emphasises the management of trauma and its complications.[23–25]

DISEASE IN WAR

On the eve of the Revolution, experience of military medicine in America was very limited. In 18th Century Europe there was evolution, the administration of military medicine increasingly becoming the responsibility of central government. This change acknowledged the unique challenges faced by army and navy physicians and surgeons.[26]

Soldiers were especially vulnerable to disease. British physician Richard Brocklesby insisted that army life was "every instant obnoxious". Disease, he claimed, took more lives in the army than in any other class of men.[27] His medical colleague, Sir John Pringle, believed that this was because soldiers were more exposed to the weather and "always crowded together in camps, barracks, and hospitals".[28] Not all troops were equally affected. Benjamin Rush observed that the soldiers of the Continental Army were less prone to illness on the march than when in camp, that those under twenty years were more vulnerable to "camp disorders", and that recruits from the American South were sicklier than their northern and eastern compatriots. Black soldiers were unhealthier than those of white European origin.[17]

Pervasive infectious diseases thinned the ranks. Armies ravaged by these disorders were soon demoralised, with military implications. General Nathanael Greene wrote to Congress in 1776.

> *There is no circumstance that strikes a greater damper upon the spirits of the men who are well than the miserable condition the sick are in. They exhibit a spectacle shocking to human feelings and as the knowledge of their distress spreads through the country, it will prove an insurmountable obstacle to the recruiting of the new Army.*[4]

Arguably, the most destructive of the diseases that imperilled the Revolutionary armies was typhus. The infection was not problematic in colonial America, the civilian population largely protected by an agricultural lifestyle in a country where land was cheap. An epidemic of "spotted fever" had occurred in troops in New York in 1760 and a disease that thrived in conditions of overcrowding and dirt was bound to break out during the Revolutionary War.[5]

Caused by *rickettsia*, a group of highly pleomorphic bacteria, typhus is transmitted by the human body louse. The unhygienic 18th Century soldier was an ideal carrier. Characteristic symptoms and signs include malaise, headache, small haemorrhages in the skin ("petechiae"), and gangrene. Fatal cases become increasingly drowsy and comatose.[15] The copious contemporary terminology of the disease reflected its connection with overcrowding. It was variously referred to as "jail distemper", "camp fever", "putrid fever", and "hospital fever".[5,29] The infection was most lethal in prisons, including those afloat. Armies on the move were typically spared. Typical antiphlogistic treatments were futile and mortality rates varied between 5 and 60%.[29,30] It is often difficult to distinguish typhus from typhoid in contemporary accounts. The latter infection, transmitted in contaminated water, tended to be less seasonal and less deadly.[31]

Dysentery appeared very early in colonial history, badly affecting the first settlers in Virginia.[5] It was the commonest disease of the Revolutionary War in all armies. Caused by a variety of bacteria, it is associated with the passage of bloody diarrhoea. In more severe cases, there is profound weakness and dehydration.[15] It was commonly referred to as the "flux" or "bloody flux" but, confusingly, in America it was also called "camp fever" or "camp distemper", terms that in Europe were applied to typhus.[5] Gerard van Swieten, a Dutch-Austrian physician whose textbook was translated and published in Philadelphia in 1776, thought the disorder either arose spontaneously or progressed from chronic diarrhoea.[32] It was not often fatal in itself but it complicated other infectious complaints. In American army doctor James Tilton's words:

> *The putrid diarrhoea was generally the result or dregs of other camp and hospital diseases; and was the most intractable disorder of any we had to deal with.*[33]

Treatment regimens were mostly ineffective although warm baths and opium may have given some comfort.[22] In soldiers worn down by the hardships of army life and weakened by comorbid conditions, the mortality rates were significant. Tilton describes "multitudes wasting away". He thought he had saved lives by the billeting of patients in the "pure air" of the countryside.[33,34]

Smallpox usually started with flu-like symptoms. The first sores appeared in the neck, throat and nose on about the fourth day. The rash then spread quickly, sometimes taking a fulminant course with early death, but more commonly manifesting itself as foul-smelling pustules especially affecting the soles of the feet, the palms of the hands, the face, neck, back and lower arms. The patient became more debilitated and dehydrated. Death, when it occurred, was typically after ten to sixteen days of distress.[18] Contemporary treatments such as bleeding very likely worsened the prognosis.[35] Reported historical mortality rates for smallpox epidemics in Britain and America were in the range of 7–30%. This variation was in part caused by different levels of immunity. American soldiers were generally less immune than the British, particularly those rebels from isolated country areas.[18] Smallpox evidently killed many soldiers but specific case fatality rates for the armies of the Revolutionary War are elusive. Earlier in the 18th Century, Brocklesby collected information from British regimental surgeons and concluded that a quarter of soldiers contracting the disease died of it.[27] Britain's American Indian allies carried smallpox to their homes.[18] They had negligible immunity, many dying before the telltale skin eruption appeared. American government records suggest mortality rates of 55–90%.[5]

Malaria was endemic in all the colonies, but it was most prevalent in the hot summers of the South where it caused great suffering in Earl Cornwallis's British army. Disease, probably mostly malaria, "…reduced British fighting capacity more effectively than patriot bullets". The rebels also understood the dangers of "warm weather campaigning" but they were not so fearful of the local fevers.[36] The origin of malaria was not understood. When Lieutenant Colonel Nisbet Balfour wrote from the British camp at Charleston that he was "in perfect health, excepting the amusement of a few muskettos and rattlesnakes", he had no conception that it was the insects that were his worst enemy.[37] The marshes and rice fields of the South were ideal for the breeding of mosquitos which carried the organisms (*plasmodia*) which caused malaria.[38]

The normal symptomatology was an intermittent high fever with rigors and exhaustion. Army doctors referred to the disease as an "intermitting" or "remitting" fever while the soldiers complained of "swamp fever" and "ague". Unusually for this period, there was a potentially effective therapy in the form of Peruvian bark, the cinchona from which quinine was later extracted.[15] A good response depended on the quality of the drug and the amount administered. British surgeon Robert Jackson, treating the men of his regiment, soon learnt that "three or four ounces seldom failed of checking progress of the most formidable fevers of America; one or two frequently did not produce any sensible effect". Jackson also noted that some British surgeons and the majority of German surgeons were not convinced of the efficacy of bark and that the mortality from fever in their regiments was a quarter to a third compared with less than one in twenty when bark was freely prescribed.[39] The drug was in short supply in the Continental Army, which received only 300 pounds during the war.[6]

Scurvy, caused by a deficiency of vitamin C, is generally regarded as a disease of navies; between 1600 and 1800, it killed more than a million sailors.[40] However, it was also a threat on land throughout the entire colonial period. In 1745, Cadwallader Colden, a sharp medical observer, informed Virginian physician Dr John Mitchell that "the scurvy is

exceedin[gly] common in North America & hardly anybody [is] free of it & often mistaken for other Diseases".[5] The diagnosis was obvious enough in Revolutionary War armies often deprived of fresh produce and reliant on "salt rations". Van Swieten graphically describes the onset of the disorder.

> *the skin is stained with spots of different colours, the mouth begins to smell, the teeth loosen in the sockets, the gums swell, itch, grow painful and bleed at the least touch.*

He was convinced of the beneficial effects of fruit and vegetables whilst remaining reluctant to accept that a simple deficiency could be the definitive cause, also invoking the role of "noisome vapours" which arose from "marshy grounds".[32]

The "itch" or scabies was a ubiquitous skin disorder in soldiers of the 18th Century. Rush recommended the frequent application of an ointment of sulphur and lard. Apparently, this had no significant side effects and "scarcely any smell".[17]

Venereal disease was also ever-present. Soldiers sought female camp-followers and a period estimate was a British regiment of 400 men would have an average of 300 cases of venereal disease in a year.[41] The "pox" was a mixture of syphilis and gonorrhoea although the two disorders were not well differentiated in the 18th Century. Mercury was widely prescribed. It was toxic and lacked efficacy and colonial nostrums such as "Keyser's Famous Pills" became popular. In severe cases, where passing urine was difficult, surgical options included probing, irrigations, and reopening the urethra by pounding the penis with a mallet.[5,42]

French physician Jean Colombier in his *Précepts sur la Santé des Gens de Guerre ou Hygiene Militaire* of 1775 divides the harmful effects of alcohol into drunkenness, accidents which occurred as a result, and toxicity to the body. The latter would include chronic alcoholic liver disease.[43] Drunkenness was epidemic in the British Army, most soldiers supplementing their rum ration by purchasing local beverages from sutlers.[44] That the Continental Army was no different is clear from the words of Major Joseph Bloomfield of the 3rd New Jersey Regiment.

> *It is strange that when men have Money that are fond of Drink, what Pains they will take to stupify themselves & then when in Liquor murder their best Friends if denyed the pernicious Liquor.*[45]

British and American army doctors were divided as to whether to condemn drink in general or only inebriation. Calls for complete abstinence were uncommon. After all, as eminent an army physician as John Pringle argued that spirits drunk in moderation could protect troops from camp diseases.[44]

Other physical disorders afflicting the soldiers of the Revolution included respiratory infections, tuberculosis (consumption), musculoskeletal ailments ("rheumatism"), heatstroke, frostbite, hookworm and various eye complaints. Yellow fever is a notable exclusion as it seems to have not visited North America between 1763 and 1793 with the possible exception of a local outbreak in Virginia in 1773.[5]

Mental illness was not much acknowledged but was undoubtedly present in the ranks. Benjamin Rush tells us that the "nostalgia of Dr [William] Cullen" or the "home-sickness" was common in the American Army, especially among the militia and those men from the New England states.[17] Van Swieten refers to "melancholy" in new American recruits.[32] The syndrome of nostalgia probably ranged from mild home-sickness to deep depression.[46,47] Rush's views on the disorder were received with indignation by senior American military officers, including George Washington, who were unwilling to give furloughs to homesick men.[48]

Their scepticism was understandable as there was also malingering. Soldiers of both sides resorted to self-mutilation to avoid active service. The anonymous author of the outrageous *Advice to Officers of the British Army* archly advises the private soldier, "If the duty runs hard, you may easily sham sick by swallowing a quid of tobacco". Feigning rheumatism was another common ploy.[49]

Compared with the almost universal futility of the attempts to treat the diseases of 18th Century armies, opinions on disease prevention were enlightened. The resultant actions can be divided into specific measures such as quarantine and inoculation, and more general initiatives to ensure "military hygiene".

Quarantine was used in the British Army both to prevent the spread of disease from military transports and to limit the dissemination of infectious disease such as smallpox. The author of the *Military Guide* of 1781 makes this explicit:

> *When any man is taken ill of the smallpox, or any other pestilential disorder, he should immediately, upon the discovery of this disease, be sent to a private and remote lodgings as can be had; and all soldiers prevented from visiting him, lest the visitors catch such distempers, and communicate the infection.*[50]

Americans used quarantine to fight smallpox outbreaks. Infected towns were cut off. Sufferers might be sent to "lonely house[s] in the middle of woods" or even offshore.[18] Johann Conrad Döhla, a Hessian soldier in British service, was in Rhode Island in 1778. He refers to a small island below Newport called Pest or Smallpox Island (now Coasters Harbor Island); "The people and children who have smallpox are sent there, because this is considered a contagious and most dirty disease".[51]

As noted, American troops were especially vulnerable to smallpox. Washington became frustrated by legal resistance to inoculation, a preventative measure against smallpox of which he was a longstanding supporter.

> *Surely the daily instances which present themselves of the amazing benefits of inoculation must make converts of the most rigid opposers and bring repeal of the most impolitic law which restrains it.*[52]

His momentous decision to mass inoculate his army in early 1777 was in part influenced by the calamitous outbreak of smallpox in American troops in Canada in 1776.

> *The deplorable and melancholy situation, to which one of our Armies was reduced last Campaign by the small Pox…has determined me…to introduce inoculation immediately.*[52]

He urged his senior officers to help in this endeavour and orders imply that inoculation of American soldiers was obligatory. On the British side, General William Howe at the siege of Boston gave his men a choice whereas General Guy Carleton in Canada made inoculation compulsory in all those who had not had smallpox.[53]

The pioneering 18th Century work of military doctors such as John Pringle, Richard Brocklesby, Donald Monro, and Jean Colombier increased the profile of preventative medicine in armies. "Military hygiene" was not, however, a novel idea, being practiced in the armies of antiquity, especially by the Romans.[28] Colombier comments that whereas army doctors of the 18th Century were preoccupied by a search for cure, the ancients were more focussed on prevention.[43]

Practical steps taken by both armies (often announced in general orders) included the encouragement of scrupulous personal hygiene, the healthy location of camp sites, more spacious accommodation, the fumigation and ventilation of barracks, the proper management of latrines, and the provision of good food and clean water. Rush, a fervent advocate of prevention, understood the key role of army officers in applying the principles of military hygiene.

> *Soldiers are but little more than adult children. That officer, therefore, will best perform his duty to his men, who obliges them to take the most care of their HEALTH.*[17]

Unfortunately, it was often not possible to maintain high standards of sanitation in the crucible of the Revolutionary War.

SURGERY IN WAR

The most obvious difference between civilian and military surgery was the frequency and severity of trauma. At the Battle of Great Bridge in December 1775, a Virginian soldier "...saw the horrors of war in perfection, worse that can be imagin'd; 10 and 12 bullets thro' many; limbs broke in 2 or 3 places; brains turned out. Good God, what a sight!".[54]

These wounds were the predictable result of the weaponry of the period. The lead musket ball was round, often jagged, and about three quarters of an inch in diameter. Its destructive effects were dependent on the range of firing. At short range (less than 50 yards), it could break bones whereas at medium range it tended to flatten and cause a conical injury. When fired at long range (more than 200 yards), the missile might cause only a minor contusion or be deflected away by uniform or kit. A mixture of the lead ball and buckshot pellets, so-called 'buck and ball', was sometimes used. Thrusting with a sword or bayonet led to penetrating wounds. Slashing with a sword caused lacerations.[15]

Artillery commonly fired roundshot which was likely to kill instantaneously or cause devastating injuries. At the Battle of White Plains in 1776, Corporal Thomas Sullivan and his comrades were in the path of a British cannonade; "one [rebel] with his head shot off and between his feet, and the other with the head and half his breast shot off".[55] British army surgeon John Ranby, whose 1744 text on wound surgery remained influential, noted that cannon balls caused "great lacerations of the parts endued with an exquisite sensation. These are ever attended with an excruciating pain".[56]

War magnified the difficulties of surgery on land and sea. Casualties of the American Revolutionary War too often had an inappropriate operation performed at the wrong time by an uneducated surgeon in dirty conditions and with no or only rudimentary pain relief. Many procedures were carried out in cold, poorly lit buildings on an operating table roughly fashioned from doors or planks. American naval surgeons were instructed to find "a convenient place" to manage wounded sailors. Their patients were carried there with their bedding and hammocks by other crew members. Buckets were provided for "expectoration, vomitus, and other products".[38]

There was no control of workload and little or no subspecialisation. Much of the surgery was heroic and speed was always vital. British army doctor Robert Hamilton rejected the common view that soldiers were somehow immune to the horrors of surgery. Even the bravest warrior who would not hesitate to charge the enemy could "tremble at the sight of a lancet".[46]

In gunshot wounds, the immediate needs were to remove the ball and to stop haemorrhage. Ranby favoured enlarging the wound and using his fingers rather than a probe or forceps. He was cautious. "I could never bring myself to thrust a pair of long forceps the Lord knows where, with scarce any probability of success". In these cases, it was often better to leave the ball in situ. Over years, some worked themselves to the surface and were then easily extracted.[56]

Jones advised basic dressings such as dry soft lint. He criticised the traditional approach to simple fractures which, he says, was performed with "more or less violence". The objectives of management were "to reduce the broken extremities, as nearly as possible to their natural situation, and to retain them when there, by the most easy, simple and effective means". Jones makes specific recommendations for the reduction and subsequent bandaging and splinting of the fracture. Compound fractures, where the broken bone penetrated the skin, often required removal of a limb.[25]

Amputation was the archetypal surgical operation of war. In the mid-eighteenth Century, there was controversy as to the indications, timing and technique. The following passage, written by James Tilton, suggests a relatively conservative approach during the Revolutionary War.

> *the longer we continued in service, amputation and cutting generally became less fashionable. From obstinacy in the patients and other contingencies, we had frequent opportunity of observing, that limbs might be saved, which the best authorities directed to be cut off.*[33]

Nevertheless, it was obvious that when there was very extensive damage to the bones, joints, nerves, blood vessels and soft tissues that limbs would have to be sacrificed to save life. Jean Faure, a French military surgeon, conducted a small trial in the British wounded at the Battle of Fontenoy in 1745. He concluded that delayed amputation was preferable.[14] Opinions remained divided at the time of the American Revolution but there was a trend towards early intervention, supported by Ranby and others.[56]

Jones gives a detailed account of the ideal preparations. His equipment included a tourniquet, tape, an amputating knife, a catlin (long double-bladed surgical knife), a saw, a tenaculum (type of forceps), needles, ligatures of waxed thread, and scissors. If the leg was to be removed, the patient was laid on a firm table and covered with blankets with a pillow to support his head. After the initial skin incision, the muscles were divided and the bone sawed through. The main arteries were then secured, the tourniquet removed, and the stump dressed with lint and linen and bandaged. The patient then rested in bed, his thigh a little elevated and the knee bent.[25]

American doctor Charles Gillman insisted that if the patient was given opium and rum and his ears were covered then, with a sharp surgeon's saw, he felt little pain.[57] This was the ideal and most wounded Revolutionary soldiers would have been fortunate to receive this quality of surgical care. Uzal Johnson, a loyalist surgeon, made the following entry in his diary for Saturday, 2 September 1780.

> *I went to see a Militaman that was in the Skirmish at Cedar Springs the 8th of August. He got wounded in the Arm. It was taken off by one Frost, a Black Smith, with a Shoemaker's knife and Carpenter's saw. He stopped the Blood with Fungus of W[hite] Oak.*[58]

Penetrating wounds to the chest by sword or bayonet were managed by enlargement of the wound to allow the discharge of blood. Musket ball wounds were simply dressed.[59] Abdominal wounds were broadly divided into those only entering the cavity and those affecting viscera. The latter were likely to be complicated by peritonitis and there was no surgical solution, only "a good deal of art".[59] More serious head wounds might be treated by trephination, the making of holes in the skull to relieve pressure on the brain. There are a few Revolutionary War anecdotal accounts of the medical management of scalping, the most successful strategy being to bore the skull and to allow the slow healing of the wound.[60] Many of these interventions were accompanied by vigorous antiphlogistic measures including bleeding.

Post-operative infection was routine, but tetanus was feared by army surgeons. Ranby describes the symptoms of what was a fatal disorder; three or four days after the operation, the man expired, "his jaw being fixed by a convulsive attack, and his countenance greatly distorted".[56]

Patients were also vulnerable to dehydration, hypovolaemic shock, and gangrene. Jones observed that those undergoing operations in the country did better then those admitted to the overcrowded American city hospitals.[25] It is difficult to generalise regarding the surgical mortality rates of the conflict. The military mortality rate for amputation at mid-thigh has been estimated to have been around 50%.[22] British naval doctor Gilbert Blane reported a mortality rate of 37% in leg amputations and 22% in arm amputations performed at Haslar Hospital between 1772 and 1778.[14] Precise figures are scarce and are not necessarily representative of the experience in America.

War did bring unprecedented opportunities for the army surgeons of the Revolution to gain experience and to improve their technique. Tilton's comment that amputations became less common may have been just one example of everyday practice changing on the front line. Despite a growing interest in surgery and an expanding literature, any real advances during the late 18th Century were haphazard, often arising

from high-risk procedures carried out by enterprising army surgeons who dared to operate when their colleagues were reluctant. John Warren successfully performed the first amputation at the shoulder joint in America.[61] John Hunter succeeded in carrying out an operation to the neck "that no one but a fool or a madman would attempt".[21]

Whatever their results, the army surgeons of the Revolution at least escaped the fate of the Prussian surgeons of the earlier Seven Years War (1756–63) who would receive an "inevitable beating" if a grenadier guard died under their care.[62]

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Medicine, Politics, and Rebellion: The Tribulations of Colonial American Medical Men at War, Part I

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INTRODUCTION

The U. S. Army Medical Department with a Surgeon General on the Commanding General's staff did not occur until the Army Reorganization Act of 1818. During our war for independence, a Hospital Department was created to care for sick and wounded Continental soldiers. Before a Hospital Department was required, a rebellion had to be organized, and a revolution begun against a tyrannical government. Many physicians, surgeons, and apothecaries played significant roles – political, military, and/or medical – in all these events. In the next few pages, we will review some of the actions of these rebel healers and the Hospital Department in the broader context of our War for Independence. Their belief in, and dedication to, the idea of freedom initiated American military medicine and assisted in the creation of the United States.

LIBERTY TRUMPS TREASON

The Treaty of Paris, which ended the French and Indian War (called the Seven Year's War in Europe), was a year old when the British Parliament decided that the American Colonies should refill war-depleted royal coffers through taxation. The Sugar Act, passed 5 April 1764, was the first of these. Molasses and sugar were taxed, and duties were placed on Madeira, indigo, and coffee. The Stamp Act, passed in March 1765, followed and went into effect 1 November. All paper products and dice were taxed. Rich and poor alike were affected throughout the colonies, but urban residents carried the largest burden. In October, a Stamp Act Congress met in New York with the goal of unifying the normally autonomously acting colonial governments to boycott British goods and prepare petitions of grievance to send to Parliament.[1]

Many physicians and surgeons in those towns entered the political fray with gusto and, as the revolution progressed, tremendous resolve. Doctor Nathaniel Peabody was on the Massachusetts Committee of Safety.[3] His colleague Dr. William Bradford was a Member of Massachusetts Committee of Correspondence.[3] Dr. Samuel Holten was a member of the Massachusetts Provincial Congress, sat on the Committee of Safety, and later became an examiner of medical candidates for the Continental Army.[3] In 1773, Dr. Nathaniel Freeman of Plymouth joined the local committee to consider resolutions from Boston. He became a member then chairman of the Committees of Correspondence and Safety.[4] Doctors Joshua Brackett and John Flagg were members of the New Hampshire Committee of Safety.[3] Doctor Matthew Thornton was elected president of New Hampshire's provincial convention in 1775. A year later he became a member of the Continental Congress and signed the Declaration of Independence.[4] Undoubtedly, rebellious medical men one and all. But the earliest, most actively and vocally rebellious, and first to call for independence from Britain, was Dr. Joseph Warren of Boston.[1]

Born 11 June 1741, Joseph Warren grew up in Roxbury, attended the Roxbury Latin School and Harvard. Before graduating he began a medical apprenticeship with Dr. James Lloyd in Boston. Lloyd came from a wealthy family which allowed him to study in London with esteemed surgeons William Cheselden, Samuel Sharp, and William Smellie. Warren was an extremely apt pupil. Upon completing his apprenticeship in 1763, he opened his office and soon became a leading physician in Boston.[1]

In the 7 October edition of the *Boston Gazette*, Warren published an op-ed piece that stated the Stamp Act was "unconstitutional," that "no man shall be taxed but with his own consent … Awake my countrymen, and by a regular and legal opposition defeat the designs of those who enslave us and our posterity."[1]

The British Ministry and Parliament were stunned at this colonial impudence. British merchants were likely quite relieved when the Stamp Act was repealed on 18 March 1766. However, that same day Parliament responded with the Declaratory Act averring their "full power and authority to make laws and statures of sufficient force and validity to bind the colonies and people of America, subjects of the crown of Great Britain, in all cases whatsoever."[1]

Warren railed against this blatant tyranny and the inherent bondage it implied. He wrote in a letter to a friend in 1766 that "when the rage of the people is raised by oppression to such a height" that it would inevitably "break out in rebellion."[1]

In September 1767, the Townshend Acts, which placed customs duties on imported paper, paint, glass, silk, and tea from Britain, were imposed. All these acts, although economically burdensome, were being imposed upon the colonies without proper representation in Parliament. Bostonians, indeed, all the New England colonies were incensed. Warren, Samuel Adams, the medical men mentioned above, and many others led the resistance in town meetings, composing resolves and petitions. A non-importation agreement was composed and garnered over 650 male and female signatures.[1] This growing, increasingly vocal resistance, in conjunction with threats to customs officials, resulted in two British regiments occupying Boston on 1 October 1768.

This occupation was a "multi-dimensional threat to Bostonians … [which] entailed economic deprivation, violence directed at civilians, violation of constitutional rights, and social chaos."[2] These conditions precipitated the Boston Massacre, 5 March 1770. The committee, of which Warren was a member, created to honor this event chose him to deliver the second annual oration. Warren affirmed that the colonies required a "virtuous and unshaken attachment to a free constitution."[1] Among the abuses he chronicled were the taxation without representation, and imposing military law on Bostonians for the "enforcement of obedience to acts which upon fair examination appeared to be unjust and unconstitutional."[1] In his closing remarks, Warren proclaimed the cherished right of liberty, a beautiful concept that "all who have once possessed her charms had rather die than suffer her to be torn from their embraces." "Use every method in your power to secure your rights." he declared, and "with united zeal and fortitude oppose the torrent of oppression."[1] This oration and the many committees on which he not only served with energy and distinction made Warren the leader of the radical Whigs in Boston. And thanks to the Committees of Correspondence among the colonies, his influence grew over the next year.[1]

Parliament passed the Tea Act on 10 May 1773. This gave the British East India Company a monopoly on tea duties to be collected in the colonies. More taxation without representation. The *Dartmouth*, carrying the first shipment of tea, sailed into Boston Harbor on 28 November followed two days later by the *Eleanor* and *Beaver*. Warren, Samuel Adams, and Paul Revere orchestrated the initial resistance to the act, directing the Sons of Liberty to gather on Griffin's Wharf to keep it from being unloaded.[6,1] Then, on the evening of 16 December, the Sons of Liberty, faces smeared with lamp black and red ochre and dressed as "Indians," boarded those three ships and dumped over 340 tea chests, into the harbor.[5, 25]

The following day Revere spurred his horse south to New York and Philadelphia with news of Boston's late-night excursion. Philadelphians were the first to react. On December 25, the *Polly*, carrying twice the cargo, and seven other tea ships stopped at Chester, Pennsylvania. The *Polly* was seized and escorted to Philadelphia. There the *Polly's* captain was intimidated with tar and feathering if his cargo was unloaded. All eight ships sailed away.[5,7] New York's response came on 22 April 1774. When the *London* docked a reception party awaited. In broad daylight without disguises they tossed 18 chests of tea into the harbor.[8]

The upshot of such insolence was passage of the appropriately named Coercive Acts, known as Intolerable Acts in the colonies, in May and June 1774: 1) the Administration of Justice Act allowed British officials who committed crimes to be judged in a different colony or Britain, 2) the Quartering Act allowed British soldiers to be put in civilian homes, 3) the Boston Port Act closed Boston's port until the tea in Boston Harbor was paid for, and 4) the Massachusetts Government Act enlarged the Royal Governor's power, restricted the General Assembly, limited the election of public officials, and limited town meetings.[8] The first two of these acts affected all colonies, but the second two were specifically for Massachusetts, the heart and soul of the rebellion. In conjunction with the passage of the Coercive Acts, British General Thomas Gage replaced the Royal Governor of Massachusetts, Thomas Hutchinson, in May. British war ships in the harbor and hundreds of soldiers in the streets proclaimed martial law was in effect in Boston. Tories there hoped Warren, Sam Adams, John Hancock, and other radical Whigs would be sent to London for treason.[1]

Furious, Warren proposed a complete trade embargo of British products into the colonies and businesses that ignored this edict would likewise be publicly shunned. He wrote the Solemn League and Covenant to that effect. Although initially controversial, even among some radical Whigs, the devastating effect of the Port and Government Acts on Boston and Massachusetts was not lost on the other colonies. Warren's Solemn League and Covenant united our 13 colonies. Representatives came together at Philadelphia as the First Continental Congress in September 1774 and signed the Continental Association supporting the boycott.[10]

On 1 September, General Gage directed the seizure of gunpowder and ammunition from an East Cambridge arsenal. Militia units from surrounding towns were notified but descended on Cambridge too late to save the powder. Gage then fortified Boston Neck effectively closing the city to all commerce.[1,11]

Gage's actions only energized and intensified, Warren's resistance to the Intolerable Acts, his distrust of Britain, and a growing desire for independence. Earlier in the summer some Massachusetts counties began holding meetings to discuss actions against the acts. During that time, Warren prepared a document of 19 resolutions protesting Britain's tyranny. He chaired the Suffolk County convention, consisting of delegates from 19 Massachusetts districts, on 9 September and read the document that would become the Suffolk Resolves. All 19 were unanimously accepted. Among the more incendiary resolves were:

The Intolerable Acts violated the rights of the people as Englishmen, under natural law, the British Constitution, and the colonial charter. Because of this:

- The people were not required to comply with the Intolerable Acts.
- Any public official associated with them should be ignored.
- Taxes should not be paid until the restoration of the constitutional government
- The Powder Alarm and fortifications at Boston Neck indicated a "hostile intention" against the people.
- Towns should elect new militia officers who were "inflexible friends to the rights of the people" and the militias should start doing drills once a week.
- The people should be prepared to act on the defensive, in light of Gage's military actions.
- A complete stoppage of trade with Great Britain, Ireland, and the West Indies.
- Election of delegates for the Massachusetts Provincial Congress, which would hold its first meeting on the second Tuesday in October, at Concord.
- The people would abide by the "wisdom and integrity of the Continental Congress."
- Instructed the Committees of Correspondence to communicate emergencies through written letters and Express Riders.[11]

A committee of delegates, with Warren as chair and spokesman, presented the resolves to Gage. "Nothing short of restoring the town to its former state," concluded Warren, "and the cessation from insult, could put the inhabitants in that tranquility in which every free subject ought to live."[11] A few days later, Paul Revere delivered the Suffolk Resolves to the Continental Congress where they were unanimously approved and adopted.

The unconstitutional and oppressive nature of the Intolerable Acts catalyzed a defiant reaction, not only in Massachusetts but in all the North American colonies. Through his personality, leadership, organizational, and communication skills, and courage, Joseph Warren energized, inspired, and united the radical Whigs. The Suffolk Resolves took Warren and the colonies across the Rubicon. The die was cast, rebellion would become revolution.

AN ANONYMOUS SHOT ON THE ROAD TO CONCORD

In January 1775, Warren was joined by his colleagues, Doctors Nathaniel Peabody and Samuel Holten, on the Massachusetts Committee of Safety. Later that same month, he and Holten were chosen as delegates to the Second Massachusetts Provincial Congress that convened on 1 February in Cambridge.[1] As the year progressed, Warren, Samuel Adams, Hancock, and Revere were placed on London's list of state enemies.[5] Lord Dartmouth, secretary of state for the colonies, told Governor Gage to arrest and imprison them and other Whigs for treason.[1] Rumors of assassination circulated with these threats, and Warren went well-armed on patient rounds.[1]

As tensions increased, accurate intelligence on the plans and movements of both sides required capable spies. Governor Gage used Loyalists and soldiers in civilian clothes in Boston and the countryside to obtain information.[1] And he bought others, such as Dr. Benjamin Church.[5] An eminent Boston physician and surgeon, Church was a trusted member of the radical Whig organization. With Samuel Adams, Hancock, and Warren, he attended important and secret meetings directed by Paul Revere at the Green Dragon Tavern.[3, 5]

By mid-April 1775, fearing arrest, Adams, Hancock and other rebels had departed Boston for the safety of the countryside. Warren remained, and his office became an intelligence repository.[5] Doctor Samuel Mather, minister of the Second Church of Boston, and James Lovell, a Boston schoolmaster, spied for Warren.[1] (Lovell's grandson, Joseph, would become the first Surgeon General to sit on the Commanding General's staff in 1818).[12] However, much of Warren's information came from Revere's spy organization of mechanics and craftsmen who could move about Boston, with eyes and ears open, unhindered by British troops.[5,6]

On the afternoon of 18 April, someone in this network informed Warren of General Gage's plans to "seize Samuel Adams and John Hancock, who were known to be in Lexington, and burn the stores at Concord" the following day.[5] Immediately, Warren summoned Paul Revere and William Dawes and instructed them to ride out of Boston by different roads that night to warn Adams and Hancock, then proceed to Concord warning everyone along the way. After finding their friends at the home of Rev. Jonas Clarke, Revere and Dawes rode on. Soon they met Concord physician, Dr. Samuel Prescott, who was returning home from seeing his fiancée. Briefed on their mission by Revere, Prescott offered to assist.[5,13]

The road to Concord and the surrounding area were subject to roving British patrols. One of these patrols stumbled into the three riders. Revere was captured but was released later; Dawes rode back toward Boston. Prescott, who had spurred his horse off the road, over a low stone fence, and onto a path leading into the woods he knew quite well, escaped to carry the alarm to Concord.[5]

Revere, Dawes, Prescott, and others unknown to history, accomplished their mission. Militia companies and minutemen were converging on Concord and the Concord-Lexington-Charlestown Road. Hancock and Adams evaded capture. In the early morning light of 19 April 1775, elements of the Lexington militia company, commanded by Captain John Parker, gathered on Lexington Green to defy British Major Pitcairn's advance guard from Lieutenant Colonel Francis Smith's command to pass on to Concord. Tensions rose as British regulars and militiamen glared at each other across the green. Then a shot rang out. Who fired the 'shot heard round the world' is still unknown. But it was followed by sporadic fire from the militia then deadly volleys from the regulars. As the dense smoke cleared slowly off the green, Lieutenant Colonel Smith caught up with Pitcairn and marched his uninjured command past the dead and dying on Lexington Green.

Smith's force found no cannon or military stores in Concord. What they found was a growing mass of angry, determined militia at the North Bridge. Doctor John Brooks, a Reading physician, commanded the Reading Militia at Concord. Doctors William Dexter of Shrewsbury, Eliphalet Downer of Roxbury, and Timothy Childs of Pittsfield were also minutemen who answered the call on 19 April. While these physicians fought in the line, Doctors Samuel Prescott, Thomas Welsh, Timothy Minot, and John Cumming treated American and British casualties alike.[14]

About noon, Smith began a long and bloody retreat to Charlestown 18 miles away. His reserve force, some 1,500 soldiers, commanded by Lord Hugh Percy had been notified of his mission very late, but was on its way.[12] Nearly 4,000 militia and minutemen had converged on what became known as Battle Road.[15] Hidden behind stone fences, trees, houses, and outbuildings they kept Smith's force under heavy fire as they leapfrogged from position to position along the road.

Percy linked up with Smith just west of Lexington in mid-afternoon, but their entire force was nearly surrounded.[5,] Heavy fire came from the north and west. From the east came General William Heath, commander of the New England militia, with the Middlesex and Essex Regiments. Heath had met with Joseph Warren at a Committee of Safety meeting at the Black Horse Tavern in Menotomy (Arlington) earlier in the day.[1] As Heath's regiments engaged Percy's retreat, Heath, with Warren alongside, found themselves in the thick of the fight. Heath remembered being exposed frequently with Warren "constantly near me … a musket ball from the enemy came so near his head as to strike the pin out of the hair of his earlock."[5]

Heath's regiments could not stand firm against Percy's artillery and were directed to move north of the road to continue harassing the redcoat column down the road.[5] In Menotomy, the fighting became more vicious as buildings were cleared room by room. A redcoat attempted to bayonet Roxbury militiaman, Dr. Eliphalat Downer. Downer evaded the thrust, grabbed the musket from him, and dispatched the redcoat with his own bayonet.[5]

South of Battle Road, Brookline militiaman, Dr. William Aspinwall, fought alongside his comrades and treated the wounded. In the last of the fighting in Cambridge, he carried the dead body of his commander, Isaac Gardner, from the field.[3]

Joseph Warren's previous apprentices, younger brother John, William Eustis, and Samuel Adams, Jr., were also engaged. Eustis and Adams treated the wounded along Battle Road. John Warren completed his apprenticeship in 1773 and settled in Salem, Massachusetts, where he worked with renowned physician, Edward A. Holyoak. John was very close to his older brother; they had similar personalities.[16,13,20] Indeed, John assisted Joseph in writing rebel propaganda.[17] After the Boston Tea Party, John joined Colonel Timothy Pickering's Essex County Regiment as surgeon.[16] On 19 April 1775, Timothy Pickering proved to be a dawdling commander. The Essex boys and a very frustrated John Warren never got to the fight.[12] However, Warren put his surgical skills to use later in the day.

A GRIEVOUS POLITICO-MEDICAL LOSS

On 20 April 1775, John Warren wrote in his diary "This day before noon upon the news of a vast number of People being arrived from all Parts of the Country to Cambridge, the Regulars cross the Ferry to Boston and General Gage begins immediately to fortify stronger."[18] Boston was now under siege.

British Major Generals William Howe, John Burgoyne, and Henry Clinton joined Gage in Boston in late May. King George III had decided that this rebellion had to be crushed by military force. The decision was made to seize Dorchester Heights and Bunker Hill across the Charles River in Charlestown.[12]

The strategic importance of occupying the high ground was not lost on rebel spies in Boston. On 16 June, the Committee of Safety received word of Gage's plan to assault Dorchester and Bunker Hill the following day. Recognizing

that Dorchester could not be adequately defended, Brigadier General Israel Putnam and Colonel William Prescott surveyed the Bunker Hill area. Forty-five feet below Bunker was Breed's Hill which was believed to be a better forward position to observe approaching British troop carriers. From midnight until dawn on 17 June, rebels constructed earthen redoubts, trenches, and breastworks on both hills.[1,12] With the rising sun, General Gage and his colleagues observed the fortified Charlestown peninsula. Naval gunfire from a battery on Copp's Hill and warships in the harbor caused some damage and desertion but could not drive out the provincials. Therefore, an amphibious landing was agreed upon. General William Howe led 2,000 regulars to the Long Wharf, boarded barges, and crossed over to Charlestown landing just south of Moulton's Point. It was mid-afternoon when the first wave of 1,100 troops, the 5th and 38th Regiments, grenadiers, and light infantry, gazed uphill to the Breed's Hill redoubt.[1,12]

Provincial Congressional President Warren, a major general in the Massachusetts Army since 14 June, also learned of Gage's intentions late on 16 June. Tradition has it that Reverend Samuel Mather's young daughter, Hannah, smuggled documents out of town under her skirts and brought them to Warren at a meeting of the Provincial Congress in Watertown.[1]

The following day, Warren attended a meeting of the Committee of Safety in Cambridge then rested for a few hours. When word arrived that British regulars were forming up in Charlestown, he departed immediately for the Breed's Hill fortifications. As historian Walter R. Borneman pointed out, it was odd for a man of Warren's stature in the patriot organization, his leadership and determination to the cause of freedom, and his total lack of military training to "ride to the sound of the guns."[12] Upon arriving on the field, the 34-year-old Warren did not pull rank on Putnam, Prescott, or Colonel John Stark – all three French and Indian War veterans. Indeed, he refused any command, shucked his coat, vest, and stock, and joined the firing line.[1,12]

"Our first fire was shockingly fatal," a provincial fighting near Warren declared. "The enemy were thrown into confusion and retreated a short distance. Their lines were broken, and it was some minutes before they had conveyed their dead and wounded into their rear."[1] In between assaults, Warren encouraged his comrades and tended to the wounded.

The Massachusetts Army had a "skeletal medical force" at Bunker Hill. Surgeons and surgeon's mates had been created at the hospital and regimental levels but there was no chief physician or surgeon to direct the whole. No hospital stewards or medics existed to retrieve the wounded; no formal casualty evacuation plan existed. According to historian Philip Cash, there were 33 medical men on the Breed's Hill-Bunker Hill battlefield. Dr and Captain Timothy Childs commanded a militia company. Colonel (Dr.) James Bricket, MD, and Drs. John Brooks, and Martin Herrick also served as combatants. After being wounded, Bricket joined Doctors William Eustis, Isaac foster, John Hart, Walter Hasting, Thomas Kittridge, David Townsend, Thomas Welch, and others treating wounded on the western side of Bunker Hill.[19]

In the enervating heat of the late afternoon, marching uphill into the rebel guns in heavy woolen uniforms, and carrying more than 60 pounds, British troops fell in heaps. Their last assault was made with close artillery support. Equipment had been dropped and bayonets fixed. As the provincial's ammunition gave out, the Breed's Hill redoubt was overrun. Vicious hand-to-hand fighting ensued. Wounded, with sword in hand, Warren fought desperately. He was the last to attempt to escape the smoke-filled redoubt but fell when a musket ball tore through his head.[1]

Dr. John Warren's Diary, 17 June 1775:

> *"This day a day ever to be remembered by the United American Colonies at about 4 o'cloc. afternoon, I was alarmed with the incessant report of Cannon which appeared to be at or near Boston, towards sun setting a very great fire was discovered nearly in a direction from Salem for Boston, at the beginning of the evening news arrived that a smart engagement had happened in the afternoon at Bunker Hill in Charlestown, between the King's Regular Troops and the Provincials, and soon after we received Intelligence our Troops were repulsed with great loss, and the Enemy had taken possession of the ground which we had broke the night before. I was very anxious as I was informed that great numbers had fell on both sides, and that my Brother was in all probability in the Engagement … [I]n the morning about two o'clock, I prepared myself and went off on Horseback, and when I arrived at Medford received the melancholy and dreadful Tidings that my Brother was missing. Upon the dreadful Intelligence I went immediately to Cambridge & enquired of almost every person I saw, whether they could give me any information of him. Some told me that he was undoubtedly alive and well, others that he was wounded, and others that he had fell on the field; thus perplexed almost to distraction I went on enquiring with a Solicitude which was such a mixture of Hope and Fear as none but such as have felt it can form any conception of. In this manner I passed several days, every Days information diminishing the probability of his safety."*[18)]

Joseph Warren's body was viciously mutilated after the battle. The following day he was dumped into a shallow mass grave. Not until the British evacuated Boston, 17 March 1776, were the Warrens permitted to find Joseph's grave. Paul Revere positively identified the body by the teeth which he had made for a man who was such a close friend he would have called him Joe.[17,1]

CREATING ARMY MEDICAL SERVICES AND TREASON

On 19 April 1775, New England declared war on Great Britain. The immediate requirement for organized and efficient medical services to the Massachusetts Army was clearly apparent. Up until this time, medical support had been cobbled together by volunteers, Whig and Tory alike. Many of the medical men who had answered the call in April were 'little d' doctors, that is, only apprentice trained and without hospital experience. After Breed's/Bunker Hill, with a larger war looming, the Second Provincial Congress created an examination board, consisting of Doctors Church, Taylor, Dunsmore, and Samuel Holten, to certify the qualifications of all surgeons, and their mates before they were granted regimental commissions.[19, 21]

The lack of equipment, medicines, facilities, and organization became high priorities for the Committee of Safety. In late June a committee to address general hospital facilities, and supplies and equipment was created consisting of Doctors Benjamin Church, Taylor, and Whiting. Equipment and medicines were provided by physicians, purchased from private citizens, and impressed from both Tories and Whigs. Andrew Craigie, a Boston apothecary, initially given charge of all medical stores in the area in April, was appointed Medical Commissary and Apothecary to the Massachusetts Army in July.[19]

The Breed's/Bunker Hill fight so overwhelmed the available medical facilities that the home of Reverend Samuel Cook in Menotomy (Arlington) was taken as a hospital under the direction of 22-year-old William Eustis. The home of Dr. Marshall Spring in Watertown also became an auxiliary general hospital. And the Cambridge home of John Hunt became an auxiliary facility to the Cambridge general hospital with 21-year-old John Warren as director and senior surgeon. Dr. Isaac Foster of Charlestown was directed to move seriously sick and injured soldiers to the Cambridge general hospital and supply a new hospital – the home of Joshua Loring – in Roxbury. In the coming weeks Foster replaced Warren as director of the Cambridge hospital and Warren became deputy director. By summer, four general hospitals were in operation.[1]

Simultaneously, the Continental Congress in Philadelphia also was preparing for a larger conflict. Three days before the clash on Breed's/Bunker Hill, it authorized the mustering of 10 companies of crack riflemen, six from Pennsylvania, two from Virginia, and two from Maryland to support Massachusetts during the siege of Boston. A day later it appointed George Washington to command the Continental forces. Washington was authorized two major generals, eight brigadiers, an Adjutant General's Department, commissary general, quartermaster general, and paymaster general. He took command on 4 July and soon recognized that he had no medical support worthy of the name. On 21 July, Washington wrote to Congress that he found the hospital in an "unsettled condition" without a "principal director, nor any subordination among the surgeons; of consequence, disputes and contentions have arisen, and must continue until it is reduced to some system."[20,21]

Six days later, Congress authorized an army of 20,000 men and a Hospital Department.[20, 29] The Hospital Bill of 1775 was written without physician assistance. It authorized one director general/chief physician, four surgeons, and one apothecary, 20 surgeon's mates, one clerk, two storekeepers, and one nurse for every 10 patients, but distressingly vague concerning the duties and responsibilities of these positions.[21]

In early August 1775, Dr. Benjamin Church was selected as Director, Hospital Department, Continental Army of the United States. A well-known and successful Boston physician, leader of the rebel cause, high ranking member of the Massachusetts Provincial Congress, Committee of Correspondence and Safety, and Son of Liberty, Church soon confronted the fatal flaws of the Hospital Bill.[19]

Although he had organized four hospitals, Church struggled to obtain medical supplies.[19] And as the sick rate went up as the Continental Army increased around Boston the small number of authorized hospital personnel became obvious.[19] The bill failed to address Church's administrative relationship to the hospital staff and regimental surgeons. It also failed to define the relationship of the regimental surgeons to the general hospitals.[19] Indeed, regimental surgeons, believing themselves to be beyond the purview of the director general, had converted their camp hospitals into independent facilities which competed with the general hospitals. At the same time, they demanded supplies and equipment, which they tended to waste lavishly, from Church.[19]

These omissions led to a bickering triangle between Church, hospital staff, and commander-backed regimental surgeons. This tendentious situation achieved a threshold in early September. Exasperated over the deluge of complaints, largely from regimental surgeons and their commanders, Washington called for a complete investigation of Church.[19] In doing so, the deceitful game Church had been playing with his friends and colleagues as a spy for General Gage came to light in October[21] The upshot was that Church was found guilty of treason and sent to prison. By May 1776, his health was so poor that he swore out a bond of £1,000 that, if released, he would remain in Massachusetts and would not engage in treasonous activities again. However, Church continued to stay in various jails, largely for his own safety. Then in 1778, Congress allowed Church to sail on the *Welcome* to the West Indies. The ship was never heard from again.[19,21,11]

Isaac Foster was delegated to replace Church temporarily, and Warren resumed command of the Cambridge facility. On 17 October, John Morgan, MD, a well-educated and influential Philadelphia physician, was selected as the Hospital Director and Chief Physician for the Continental Army.

Educated in Edinburgh and London, Morgan brought British medical theory and practice back home. Furthermore, from his French and Indian War service and education in Britain, he was familiar with and understood the British model of military medicine. That is, military hospital administration and emphasis on preventive medicine.

Morgan was unanimously elected professor of medical theory and practice at the College of Philadelphia in 1765. His practice, influence, and desire to transform American medical education grew over time. He devised plans for inaugurating a medical school affiliated with the College based on the British model. However, his colleague and equally influential Philadelphia physician, William Shippen, Jr., who taught anatomy at the College, appears to have been completely left out of this planning. In early May 1768, Morgan presented his plan, which failed to mention Shippen or his lectures, to the College trustees when Shippen was absent. This power-play (essentially a fait accompli and insult to Shippen) was approved and set the stage for vengeful recriminations during the war.[22]

Morgan has been presented as a vain, overly sensitive, elitist and, it is true, General Washington would rather have had Shippen as Hospital Director.[19, 22] Morgan's biographer, Whitfield J. Bell, commented that Morgan was conflicted "between the ideal and the possible … what he knew ought to be and what in the actual circumstances could be, and the … inability to understand the difference."[22] However, John Adams remarked on Morgan in a letter to Abigail that "Jealousy and envy spare nobody. Some have whispered that the Dr. is a little visionary in theory and practice. But all agree that he is attentive, vigilant and laborious for the good of his patients in a great degree, and he is said to be a pious man."[19]

Through the fall and winter 1775-1776, Morgan wrestled with the same problems as Church: shortages of medicine, supplies and equipment; recalcitrant and devious regimental surgeons; an ambiguous chain-of-command; and little help from Congress. And the siege of Boston continued.

Washington persevered in extending his fortifications around the city. However, if Dorchester Heights had artillery large enough to reach into the British lines, General Howe would find himself and his army in a precarious position. On 16 November, Washington ordered Henry Knox to retrieve all the cannon and mortars he could from Fort Ticonderoga and bring them to Boston. Knox arrived at the fort on 5 December, collected one brass 24-pounder, 13 18-pounders, 10 12-pounders, two 8-inch howitzers, and other smaller artillery for a total of 43 pieces. He departed Ticonderoga on 17 December and presented them to an amazed and delighted Washington on 25 January 1776.[23]

This miraculous achievement and strengthened fortifications convinced Howe that he could not break out of Boston through the American lines. On 17 March, he loaded up his large fleet and departed Boston Harbor for Halifax, Nova Scotia to refit and prepare for his next move against the Colonies.

General Washington, fearing Howe was heading directly for New York City, deployed riflemen from Pennsylvania, Maryland, and Virginia to reconnoiter King's County (Long Island), Staten, and Manhattan Islands. General William Alexander, Lord Stirling, was dispatched to the New Jersey shore to direct construction of fortifications extending from New York City to Paulus Hook, Amboy, and Elizabeth. Two thousand New Jersey militia fell in on these defensive positions.[24]

On 13 April, Morgan was ordered to move the general hospital to New York immediately. He was to leave enough medical personnel and supplies at Cambridge to care for those too sick or injured to make the march south. All other medicines, equipment, supplies, and bedding were to be transferred to Norwich, Connecticut for shipment to New York. Any medicines left by the British, which were not adulterated with poison, were to be included. Finally, Morgan was to ensure that the five Continental regiments remaining to protect eastern Massachusetts had full medical chests. Nine days later, Morgan reported to Washington:

> *"Sir, I take this opportunity to inform your Excellency that I am constantly employed in collecting and forwarding the Hospital stores to New-York, and in executing your orders relative to the drugs and medicines, &c., left in the Ministerial Hospital … I have and am collecting a noble store of medicines for the ensuing campaign; and I hope to leave no room for complaint of any scarcity or want of either medicines, beds, blankets, or other hospital stores for the Army; having got a sufficient supply … of medicines for the year to come … with fifteen hundred additional blankets and rugs, as many beds and pillow, &c., by the care and attention of my Steward and Quartermaster of the Hospital, Mr. Carnes, who has spared no pains in executing my orders."*[19]

Morgan's most persistent and vexing problem, the relationship of regimental surgeons to the general hospitals and the Hospital Director, was related to the ambiguous medical chain-of-command and, therefore, to Congress. This tripartite issue had come to a head in the Northern Department during the invasion of Quebec Province in the winter and spring of

1776. A two-pronged attack striking Montreal and Quebec City to secure northern avenues of approach into the Colonies ended in failure due to smallpox and a harsh Canadian winter.

In preparing for the Canadian Campaign, the director of the hospital in the Northern Department, Dr. Samuel Stringer, considered himself autonomous from Morgan. He asked Congress for more surgeons and mates and sent no medical reports to Morgan. He also requested that Washington order Morgan to share his medicines and supplies.[24] Morgan protested that he had no authority from Congress to support Stringer. Moreover, he noted, it had created a Hospital Department, general hospital, and departmental hospital without establishing a chain-of-command or the duties and responsibilities of those organizations.[22]

In July, an apparently obtuse Congress decided that Morgan was Director General and Physician in Chief of the American hospital and Stringer was Director and Physician of the hospital in the Northern Department only. Both men were authorized to appoint surgeons and hospital personnel. Stinger was directed to send monthly medical reports to Morgan, but this did not imply he was subordinate to the Director General.[22] Congress then compounded the command and control confusion by creating a Continental Hospital directed by Dr. William Rickman at Williamsburg, Virginia and appointing Dr. William Shippen as Chief Physician to the flying camp established at Trenton, New Jersey. They also appointed Dr. Jonathan Potts as surgeon in the Canada Department "with the understanding that the appointment was not to supersede Doctor Stringer."[21]

As Washington continued to prepare a reception for the British army that landed on Staten Island on 2 July, he told regimental surgeons that if they did not "act with the strictest Honor, and Candor, in their draughts upon the several Stores, and accounting with the Director General of the Hospital, when required," their hospitals would be shut down "in justice to the public." When requested to explain what he meant, Washington replied that 1) surgeons could send patients to general hospitals any time unless they were sick with infectious diseases, 2) the Director General or hospital surgeons could remove patients from regimental hospitals, and 3) any disputes between regimental and hospital surgeons was to be referred to the Director General, "who has by the Resolution of Congress a superintendency over the whole."[22]

Washington defined 'superintendency over the whole' as directing, that is, commanding, the entire Hospital Department of the Continental Army. Congress appears to have defined the phrase as a director supervising and advising those only in the immediate vicinity.

Congress did pass a revised medical law on 17 July 1776 addressing regimental surgeons. The law more clearly defined the Director General's scope of power, the administrative duties of regimental surgeons, an increase in their pay, and limited their general hospital supply requests to medicines and instruments only.[25] Regimental surgeons were not impressed. Their pay was still less than that of hospital surgeons and without bedding, clothing, and food they continued to send patients to the general hospitals. Morgan, not Congress, took the blame for regimental supply and patient disposition problems.

The congressional failure to address Hospital Department command and control responsibilities, duties, and procedures would have devastating consequences for medical services and Morgan personally. But for the moment, his entire focus was on the coming battle in New York.

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Medicine, Politics, and Rebellion: The Tribulations of Colonial American Medical Men at War, Part II

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MILITARY DEFEAT AND COORDINATED MEDICAL RETREAT

On the evening of 9 July 1776, Washington's troops heard the stirring words of the Declaration of Independence as it was read to them in their various camps.[1] Forty regiments had converged on New York City from April through June. Washington's defense of New York City, that is, Manhattan Island, consisted of controlling the rivers surrounding the island. The North (Hudson) River had a battery and artillery emplacements on Governor's Island, Red Hook, and at Forts Washington and Lee. To cover the East River, he sent Major General Nathaniel Greene to secure Brooklyn Heights on Long Island.[1, 2]

On Manhattan, Morgan's primary hospital was at King's College followed by the City Hospital, City Barracks, and some private homes approved for the purpose by the New York Convention. A smallpox hospital was established on Montressor's Island.[3] John Jones, MD, a veteran of the French and Indian War and author of one of America's earliest military medical texts, *Plain Concise Practical Remarks on the Treatment of Wounds and Fractures* (1775), stood ready at King's College.[4] On Long Island, James Tilton, MD, Surgeon in the Delaware Regiment, was to Greene's right front as part of Brigadier General Sterling's brigade covering the Gowanus Heights.[5] And Colonel Henry Knox's Artillery Regiment was in the capable hands of Dr. William Eustis.[6]

Morgan assigned the Long Island hospital, situated in General Nathaniel Greene's division overlooking the Flatbush and Bedford Passes, to Dr. John Warren and three mates.[3]

Morgan's practical and concise instructions to Warren and the regimental surgeons demonstrate his administrative talents and knowledge of Donald Monro's 1764 treatise on military hospital operations.[7] There were careful records of all patients, their disease, and dates of admittance and discharge. Regimental surgeons could hold on to their patients and draw supplies from Hospital Department stores. However, if they did so, they were then part of the Long Island hospital and, therefore, under Morgan's authority. Nurses were to be hired. Surgeon-approved regulations for the unit's personnel and patients were to be read aloud to the patients and posted with rules for diet. Warren was given a storekeeper to deal with commissary and quartermaster needs, and he was to select an orderly mate to maintain hospital furniture, bedding, and patient's clothing and personal items.[3]

Although optimistic concerning a battle on Brooklyn Heights, Washington realized that if he had to evacuate Long Island the British would soon seize New York City. In that case, the army's medical support had to be moved: all casualties, stockpiled supplies, equipment, and medicines would have to be moved rapidly, and only the buildings would be left. Morgan was sent to Newark, New Jersey to establish a general hospital that would accommodate 1,000 casualties. He put Doctor Isaac Foster in charge and assigned Dr. William Burnet and eight mates to assist. Morgan also established temporary hospitals at Elizabeth, Morristown, Fort Lee, and a 300-bed facility at Hackensack. In New York field hospitals were opened at White Plains, Westchester, and in St. Paul's Church at Eastchester.[3,8]

On 27 August, Howe outflanked Washington's army, inflicting nearly 1,000 casualties, but did not overrun their positions nor did he destroy American morale and resolve. The following day, Washington deployed 9,500 more troops to Long Island. On 29 August, during a war council to discuss a retreat, he learned that British ships had come through Long Island Sound to Flushing Bay. If Howe crossed the East River and took Kingsbridge, the Continental Army would be surrounded and destroyed. Retreating to Manhattan was the only option.[1]

The uneventful evacuation of 10,000 weary soldiers to Manhattan was a miraculous feat. Removing the casualties to Newark, however, was difficult. Morgan remarked was a "dreadful scene of confusion and disorder.. There were not enough wagons to get wounded to boats, which were late to arrive, and ferry them across to New Jersey.[3] Meanwhile, Doctors Warren, Philip Turner, and their colleagues on Long Island raced to evacuate the sick and wounded across the East River and up Manhattan to Eastchester.[8,9] The medical problems were part of the larger logistical trouble: previously, Washington had been drawing supplies from New England around to New Jersey; not only did the British

capture many horses and wagons in New York City, they forced the Continental Army onto a single line of communication into New Jersey and onwards to the Middle Colonies.

Howe's snail-like pace through September allowed Washington to gather his forces on Haarlem Heights. It also permitted the Hospital Department to catch its breath, if only momentarily. Dr. McKnight was at the White House two miles from Kingsbridge. Doctors Adams and Eustis were posted at Valentine's Hill two miles from the bridge on the Boston Post Road.[9] Warren directed health care in Eastchester at St. Paul's Church until he became seriously ill in September (smallpox has been suggested).[8,9]

Washington checked the British at Haarlem Heights on 16 September. When Howe landed 4,000 troops at Throg's Neck and the same on Pell's Point a few days later, flanking the Continentals to the east, Washington began a withdrawal north to White Plains. The hospitals along the Boston Post Road from Eastchester to Kingsbridge were hastily closed and fell in on the retreating columns. Morgan and Warren evacuated "several hundreds" of patients to the Hackensack hospital, which Warren directed while Morgan dashed to White Plains.[3]

Once again, Washington checked a slow-moving General Howe at White Plains on 28 October, then retreated across the Hudson River into New Jersey. These Fabian tactics, although criticized at the time, kept the Continental Army alive to fight another day.

In New Jersey, the inept and obtuse nature of Congress regarding the Hospital Department reached a crescendo. Earlier in October, that body, apparently without consulting Washington or any physicians, decreed that Shippen, who directed the flying camp hospital in Trenton, was to "provide and superintend an hospital for the army, on the state of New Jersey," and Morgan to do the same "for the army posted on the east side of Hudson's river."[3] The absurdity of such an arrangement, and the inevitable confusion it caused, is so obvious that it needs no explanation. Washington considered that Morgan, as Director General, was overall in charge of the Hospital Department wherever it was, and Shippen only for those in the flying camp.

Congress, state Committees of Safety, field commanders and their surgeons continued to harass, rather than assist, Morgan as he conducted a difficult medical retreat from New York to New Jersey.[10] Shippen, a politically influential Philadelphia socialite, who married into the equally influential Virginia Lee family, informed his brother-in-law, and member of Congress, Richard Henry Lee, that under Morgan the sick and wounded had been poorly cared for by unqualified surgeons and mates.[3] Furthermore, Shippen accused Morgan of taking pay from subordinates, withholding hospital supplies, and keeping rations for his own use.[11] He also whined to the Board of War and pleaded with Washington to please help relieve him from his "disagreeable suspense" concerning his duties.[10] Regrettably, Washington did so by reneging on his original support for Morgan and ordering him back across the Hudson.[10]

Morgan accused Congress, where he had few friends, of administrative malfeasance. He was quite correct. From the time Morgan became Director General, Congress not only failed to support him, but actively worked against him and the Hospital Department's best interests. No matter, on 9 January 1777, that body summarily dismissed Morgan from the Hospital Department based on the unfounded accusations of a jealous and spiteful rival. (Morgan was not exonerated of any wrongdoing until 12 June 1779).[3] Congressional favorite, Dr. William Shippen now took over as Director General of the Hospital Department.

For whatever faults John Morgan may have had, he was a competent, efficient, energetic, and dedicated Director General of the Hospital Department. He recognized the organizational and administrative deficiencies of the department created by Congress and offered sound solutions to them.

As these events occurred, the Continental Army retreated south through New Jersey along its improvised line of communications towards Philadelphia with General Charles Cornwallis close on its heels. It was a terribly sick army, and had been, since summer. In early August, 25.3% of the army were sick, by mid-September 31.9%, in late October 30.3%, and December 27%.[12] Temporary hospitals in Newark, Elizabeth, Brunswick, Amboy, and Trenton contained hundreds of patients. Others found refuge in homes, barns, and churches. Many of these poor souls were sick with dysentery, louse-borne typhus, smallpox, and perhaps malaria. Regimental surgeon James Tilton commented decades later that soldiers "dropped like rotten sheep on their straggled rout [sic] home where they communicated the camp infection to their neighbors and friends of which many died."[13]

Without enough physicians to care for them, the sick fled to Philadelphia.[3,14] Their numbers had increased at an alarming rate through the first week of December. That same week, Philadelphians learned that Washington had crossed to the west side of the Delaware River, and Cornwallis had arrived at Trenton only a day's march away. As the sick rolled in, many citizens packed up and moved out, shops closed, and martial law was declared.[15,16]

General Washington and Dr. Thomas Bond, Sr. of the Pennsylvania Hospital requested the Philadelphia Council of Safety to prepare for the rapidly developing emergency. On 6 December, the Council resolved that "Major Isaac Milchor, Mr. Thomas Smith, and Captain William Davis be authorized and empowered, with Mr. Christopher Marshall and Mr. Thomas Casdrop, to provide and take care of the

sick troops daily coming to this city from camp, and that they make use of any empty houses and stores and other buildings in this city and the Liberties thereof, which they may think convenient for lodging such troops."[17] Marshall, a successful apothecary, was appointed to lead the Committee of Sick and Wounded soldiers in this endeavor. The Pennsylvania Hospital, the Bettering House, the smallpox hospital, and homes and stores abandoned by Loyalists provided quarters, but Marshall was advised by the Council to find another 30 houses for conversion into hospitals.[14] During this same time, hospitals were being established in Bethlehem, Allentown, Morristown, and Easton, Pennsylvania, towns chosen for being a safe distance in case the British occupied Philadelphia.

Dr. Jonathan Potts, on leave from his post in the Northern Department, was appointed to supervise treatment. (Potts would return north in February 1777 as Director there). Although quantity of physicians and surgeons may have been problematic, quality was not. Along with Potts were Doctors Philip Turner, Ammi Cutter, Benjamin Rush, John Warren, Adam Kuhn, William Shippen, Bodo Otto, Thomas Bond, Sr., and others.

Some regimental surgeons were detailed to assist this distinguished group as December progressed. One of these, a well-trained German surgeon/apothecary in the Pennsylvania militia, was Liveright Piuze. Put in charge of one of Marshall's expropriated homes and given a mate to assist him, Piuze impressed both Turner and Cutter with his medical and surgical skills. However, like some of his colleagues, he became a patient too, likely with typhus, under Turner's care. Once Piuze recovered, Cutter recommended him to Congress as an excellent choice for surgeon at Fort Pitt in the Western Department in April 1777.[18]

TRYING TIMES AND FABIAN TACTICS

On 19 December, the *Pennsylvania Journal* published the first of 13 installments entitled "The Crisis" by Thomas Paine. "These are times that try men's souls," the essay began, "The summer soldier and sunshine patriot will, in this crisis, shrink from the service of their country … Tyranny, like hell, is not easily conquered, yet we have this consolation … that the harder the conflict, the more glorious the triumph. What we obtain too cheap, we esteem too lightly; it is dearness only that gives every thing its value."[19]

. Six days later, on a cold Christmas night, Washington crossed the ice laden Delaware River 10 miles north of Trenton, New Jersey. He sent a courier to Dr. Shippen to send his primary surgeons immediately to support his forces on the move.[3] Early the next morning, the Hessian force there, neither drunk nor surprised, was overwhelmed.[16] General Cornwallis marched his army south from Princeton on 2 January in an attempt to retake the town, but to no avail.[16] As British and Hessian troops settled down for the night, Washington led his army on a cold and completely unsuspected night march to Princeton and the rear of Cornwallis' army.[16] The move occurred so rapidly that Middle Department doctors Benjamin Rush and John Cochran, who had recently arrived to take charge of the wounded at Trenton, were not informed that the army was on the move. As Cochran began his patient rounds next morning, he saw the army had gone. He and Rush moved their patients to Bordentown, then rode for Princeton arriving after the battle was over on 7 January.[3]

Rush, Cochran, likely Jonathan Potts, and other surgeons established a hospital at Nassau Hall. There they cared for American and British casualties which included General Hugh Mercer, a physician in civilian life. Mercer had been clubbed and bayonetted as he lay wounded on the ground, wounds that would soon prove fatal.[3,16]

The battle of Princeton was a victory that startled and stunned the British Army and American Loyalists. Cornwallis, fearful of a follow-up attack, scurried his forces off to Brunswick, New Jersey. Washington realized he had no troops for such a venture. His soldiers were cold, exhausted, and hungry; many departed for home for the winter. Those that remained may have looked like ragamuffins, as they marched north from Princeton to their Morristown encampment, but no summer soldiers or sunshine patriots were in their ranks.

The Morristown encampment is not, but should be, as famous as that at Valley Forge the following year. The misery of a winter encampment and shortages of food and clothing were exacerbated by a smallpox epidemic progressing through the Middle Department. Washington feared it would break out among his troops and do more harm than British guns. At Morristown the commander-in-chief of an army ordered the immunization of his entire force for the first time in history. It was a risky move, which has been called the "most important strategic decision of his military career," and it proved entirely worthwhile.[21] He repeated these inoculations at Valley Forge.[3]

Also in February, Doctors Shippen and Cochran presented a new plan for the Hospital Department based on British military hospital administration and regulations to Congress. These were essentially what Dr. Morgan had advocated earlier. The most pressing issue was regimental surgeon pay which was lower than that of hospital surgeons. Like Dr. Richard Brocklesby, Shippen and Cochran stated, with Washington's written support to John Hancock, that competent surgeons would not accept the responsibilities, challenges, and hardships of wartime service for the pittance offered.[21]

A Congressional Committee was formed, without physicians and surgeons, and passed a bill on 7 April 1777 that raised the pay of all physicians, surgeons, and mates. They created a Director General, Deputy Directors, Assistant Deputy Directors to superintend hospitals, Senior Surgeons, Senior Physicians, Second Surgeons, Apothecaries and mates, Commissaries, Stewards, Matrons, and Nurses. And there were physicians and surgeons for each army in the field. Moreover, the administrative and purveying responsibilities remained in the hands of one person. Historian Harvey E. Brown understated the problem with the bill when he noted that the "complex character of the organization and the multiplication of offices" were major defects.[21,34,38]

The Continental Army remained a sickly one through the winter and spring of 1777. Bickering between hospital staff and regimental commanders and their surgeons continued unabated. Congressional failure to organize a Hospital Department command and control structure that was operationally integrated into the army put the responsibility for order on Washington's shoulders. He ordered that daily sick lists be turned-in to regimental surgeons. Regimental surgeons could not go on leave or transfer patients to hospital without Dr. Cochran's permission, and they were to report to him twice weekly. Those who disobeyed would be arrested.[3]

As to hospitals, Washington found that some of his officers were subverting hospital physician authority in various ways, such as removing sick soldiers from care. Washington maintained that physicians had complete authority in, and control of, hospitals. Officers could only visit hospitals to check on the status of their soldiers.[3]

In the spring of 1777, Washington informed Congress that Philadelphia, the colonial capital, would not be his objective in the coming campaign. Undoubtedly, he recognized he could not beat the British Army in a head-to-head contest. If he took Philadelphia, he could not hold it but only bring death and destruction to the city. To defend Philadelphia and maintain his army, he would attack the enemy but not be drawn into a major engagement.

General Howe sailed his army up Chesapeake Bay, disembarked at Head of Elk, Maryland on 25 August, and marched toward Philadelphia. Washington's attempt to block Howe at Brandywine Creek, 11 September, failed. Fortunately, the hospitals were far enough west of Philadelphia and were not disturbed. The army retreated northeast along the Schuylkill River. A surprise bayonet attack on General Anthony Wayne's command at Paoli, 21 September, was followed by the British occupying the capital on 26 September. Washington made one more attack on Howe at Germantown on 4 October which resulted in defeat.[23]

Washington began the Philadelphia Campaign with only about 14,500 effectives (80% strength). The campaign claimed over 200 lives and created at least 1,100 wounded. As the British approached, Philadelphia hospital facilities were hastily closed and patients moved to Middle Department hospitals already full of sick and wounded.[3]

Washington's Fabian tactics had allowed the Continental Army to remain intact once again. However, after General Horatio Gates decisive victory over General Johnny Burgoyne at Saratoga in early October, there was growing sentiment that such tactics demonstrated incompetent leadership. Some Congressional politicians, such as Richard Henry Lee, Samuel Adams, and John Adams, were known critics. Criticism among some officers was driven to an action threshold by Brigadier General Thomas Conway. The movement, known as the Conway Cabal, to replace Washington with Gates had support among a few officers including Gates.[24]

As these events transpired, Washington searched for a proper place to encamp his army as winter ended campaigning for another year.

SHIPPEN'S HOSPITAL DEPARTMENT

Through the fall of 1777, the number of sick soldiers in overcrowded hospitals expanded greatly. Shortages of blankets, medicines, and clothing continued to plague Shippen just as they had Church and Morgan. Washington commented, "It is but too melancholy a truth, that our Hospital Stores are exceedingly scanty and deficient in every instance, and I fear there is no prospect of their being better shortly,"[3] Three thousand soldiers fit for duty remained in hospitals for lack of shoes.[22] So incensed was New Jersey Governor William Livingston over apparent patient neglect that he wrote letters to Congress. Moreover, he badgered Washington into detailing field officers to make hospital daily rounds on their sick troops to ensure they were properly cared for.[22]

Shippen wrote to Congress concerning these deficiencies in October:

> *"The pressing necessity of the Hospitals, which begin to feel the effects of cold and dirt, calls on me to address you in a serious manner, and urge you to furnish us with an immediate supply of clothing, requisite for the very existence of the sick now in the greatest distress in the hospitals, and indispensably necessary to enable many who are now well and detained solely for want of clothing to return to the Army."*[24]

An impoverished country, rather than wanton neglect, was to blame, but officers and soldiers declared it was mismanagement by Shippen. Doctor James Tilton, director of the

Princeton Hospital, echoed Brocklesby's admonition that directing and purveying functions should not reside in one person. Although he noted, with tongue in cheek, that he was not pointing at any man, Tilton said "when the Director General had the entire direction of the practice in our hospitals, as well as the whole disposal of the stores, he was interested in the increase of sickness, and consequent increase of expense, as far at least, as he would be profited, by a greater amount of money passing through his hands."[22] Doctor Benjamin Rush, signer of the Declaration of Independence, former member of Congress, and now Middle Department Physician General, wrote to Congress that the deplorable condition of patients was due to a "want of checks upon the lower officers of the Hospitals," an issue which he said, Shippen would not concern himself.[3]

The upshot of these complaints on 1 January 1778 was a new Congressional committee composed of Rush, Livingston, and others with the authority to provide immediate relief for the sick and reorganize the medical department as they saw fit. Rush and Shippen were ordered to explain the current state of the Hospital Department before Congress and a committee member was sent on a hospital inspection tour. Funding for hospital supplies was the main problem to be overcome. Congress resolved that officers would have $10 and soldiers $4 deducted from their pay if they were sent to hospital with a venereal disease. The money raised would be used to purchase blankets and shirts for the hospital.[22] (No record exists of the amount of money collected. It does suggest that STDs may have been a large problem in the Continental Army since those in Congress thought such fines would correct the linen shortage.)

Arguably, the most important decision of this new medical committee was to relieve the Director General of supply responsibilities. The position of Deputy Director for the Middle Department was created along with Assistant Deputy Directors for each district. Doctor Jonathan Potts filled the position. He and his assistant were assigned all purveying duties: salary and incidental expenses payment, procuring medicines, supplies, and equipment and distributing the same. Moreover, accounting procedures were tightened.[3]

METAMORPHOSIS IN A CRUCIBLE OF COLD, FAMINE, AND DISEASE

As these events were transpiring, Washington moved his army onto the snow-covered hills of Valley Forge just 19 miles from the colonial capital on 19 December 1777. He was aware of the treachery of Conway but had more immediate and pressing issues on his mind: keeping an eye on roving British patrols while feeding, clothing, and sheltering an army, that was quickly fading away as winter progressed. (Winter allowed a pause in warfare until the second half of the 19th Century. Officers were often given furloughs and many rank and file just departed for home until spring to ensure their families were fed.)

Washington put his cold, hungry 10,000-man army to work building huts and a camp hospital. With no meat and only 25 barrels of flour at hand, he sent out foraging parties to gather what food they could find. When questioned, the Commissary Departments could promise nothing.[25]

The misery of the army in the first days at Valley Forge was recorded in the diary of Albigence Waldo, a surgeon in the Connecticut Line Regiment:

> *"There comes a Soldier, his bare feet are seen thro' his worn out Shoes, his legs nearly naked from the tatter'd remains of an only pair of stockings, his Breeches not sufficient to cover his nakedness, his Shirt hanging in Strings, his hair dishevell'd, his face meagre; his whole appearance pictures a person forsaken & discouraged. He comes, and crys with an air of wretchedness & despair, I am Sick, my feet lame, my legs are sore, my body cover'd with this tormenting Itch — my Cloaths are worn out, my Constitution is broken, my former Activity is exhausted by fatigue, hunger & Cold, I fail fast I shall soon be no more!"*[26]

A distressed and indignant Washington wrote to Congress on 23 December, "I am now convinced beyond a doubt that unless some great and capital change suddenly takes place in that line, this Army must inevitably be reduced to one or other of these three things – Starve – dissolve – or disperse, in order to obtain subsistence in the best manner they can."[27]

Compounding these difficulties were diseases – pneumonia, jail fever (louse-borne typhus), dysentery, putrid fever, and smallpox – that increased through winter and spring, and proved fatal for many. Hypothermia and frostbite were constant threats, and scabies increased the discomfort of daily camp life tremendously. Although Physician and Surgeon General of the Army John Cochran and more than 60 surgeons and 33 surgeon's mates were present at Valley Forge, their therapeutic endeavors were continually thwarted by the scarcity of hospital bedding (straw), clothing, medicines, equipment, and bandages. Even when these items were available a shortage of wagons and horses hampered distribution.[3]

A lack of transportation also hamstrung efforts to move patients to and from hospitals at Reading, Ephrata, Easton, Lititz, Yellow Springs, and Bethlehem, although the British forces did not get close and force hospitals to move. These facilities became so overcrowded with sick and wounded since the Germantown battle that one physician believed that overcrowding alone caused half of the fatalities encountered.[3] Sadly, many of those who were admitted with only mild illness or injury died from disease acquired on their bed

of vermin-infested straw.[24] Doctor James Tilton commented later that "It would be shocking to humanity to relate the history of our general hospitals in the years 1777 and 1778, when it swallowed up at least half our army, owing to a fatal tendency in the system to throw all the sick of the army into the general hospital, whence crowds, infection and consequent mortality too affecting to mention."[24]

About 11,000 men marched into Valley Forge in December 1777. By the end of March 1778 somewhere between 2,000 and 3,000 thousand had died. Exact numbers will never be known as patient record keeping was often haphazard. Moreover, uncounted numbers died while being transferred from the winter encampment to the various hospitals scattered over southeastern Pennsylvania.[25]

However, even as this human crisis played out in early 1778, events transpired that encouraged Washington, if not the rank and file, that all was not lost. In late January, he learned that not only Conway and Gates were scheming for his removal, but also that Congress was looking favorably upon that action. Washington threatened to resign and return to Mount Vernon. When this information became broadcast, public outrage and support for the commander-in-chief put an end to the cabal.[25]

In early February, Washington's patience with the Commissary Department came to an end. He sent General Anthony Wayne, Captain Henry Lee, Jr., and General Nathaniel Greene t. New Jersey, Delaware, and Pennsylvania, respectively, to confiscate food, forage, horses, cattle, sheep, hogs, wagons, and other supplies in exchange for certificates of value given to owners to redeem after the war. Soon thereafter Greene became our first Quartermaster General as much for his ability to extract money from Congress as for his competent, productive logistical organization.[25]

While Greene was opening supply channels, another actor came onto the frozen Valley Forge stage: Lieutenant General Baron Friedrich Wilhelm Ludorf Gerhard Augustin von Steuben. Although neither a general nor a baron, he had been trained in Frederick the Great's Prussian Army, became a very competent officer, and rose to the rank of Captain before the end of the Seven Years War put an end to his European military career. However, a little false advertising did get him to meet Washington, who took advantage of his training skills.[25]

Von Steuben is generally known for teaching and training Valley Forge officers, non-commissioned officers, and enlisted ranks in the duties, responsibilities, manual exercises, and maneuvers required for ceremonial occasions and combat. His *Regulations for the Order and Discipline of the Troops of the United States* (March 1779), known as the "Blue Book," was the first set of U. S. Army regulations. It remained the standard training manual for decades, and continues to contain pertinent information in the 21st Century.[28] It contained also the first health regulations for the army.

However, as the encampment began to thaw in March, the stench of dead horses, open privies, and rotting garbage made training almost unbearable and diseases more likely. Cleanliness of the camp became von Steuben's first lesson and can be found in chapter 17:

> *"When a regiment enters camp, the field officers must take care that … the sinks and kitchens are immediately dug in their proper places.*
> *One officer of a company must every day visit the tents; see that they are kept clean … and that no bones or other filth be in or near the; and when the weather is fine, should order them to be struck about two hours at noon, and the straw and bedding well aired.*
> *The soldiers should not be allowed to eat in their tents; except in bad weather; and an officer of a company must often visit the messes; see that the provision is good and well cooked.*
> *The quarter-master must be answerable that the parade and environs of the encampment of a regiment are kept clean; that the sinks are filled up, and new ones dug every four days, and oftner in warm weather; and if any horse or other animal dies near the regiment, he must cause it to be carried at least half a mile from camp, and buried."*[28]

Chapter 19 directs that the "men may always appear clean on the parade, and as a means of preserving their health, the non-commissioned officers are to see that they wash their hands and faces every day, and oftener when necessary.. And if a river is near, "and the season favorable, the men shall bathe themselves as frequently as possible."[28]

Von Steuben stated at the beginning of Chapter 23, "Treatment of the Sick:" "There is nothing which gains the officer the love of his soldiers more than his care for them under the distress of sickness."[28] He advised that three tents be raised to accommodate those not ill enough to be sent to the general hospital; an 18th Century aid station.[28] Every week or more often is required the surgeon will provide the commanding officer with a "return of the sick of the regiment, with their disorders."[28]

And von Steuben recognized the primacy of the regimental surgeon concerning illness and injury: "When a soldier has been sick, he must not be put on duty till he has recovered sufficient strength, *of which the surgeon should be the judge*.. And "The surgeons are to remain with their regiment as well on the march as in camp, that in case of sudden accidents they may be at hand to apply the proper remedies."[28] (More of Steuben's regulations are in the documents section.)

These last regulations concerning the sick suggest strongly that he was familiar with the current military medicine texts: Sir John Pringle's *Observations on the Diseases of the Army in Camp and Garrison* (German translation, 1754), Gerhardt van Swieten's *Kurze Beschreibung und Heilungsart der Krankheiten, welche am öftesten in dem Feldlager beobachtet werden, samt beygefügten Recepten, welche vor die Königl. Französtsche Armee vorgeschrieben werden* (1759), and/or Ernst Baldinger's *Von den Krankheiten einer Armee* (1765). In June 1778, von Steuben was made the Inspector General of the Army with the rank and pay of major general.

The other significant event was the Franco-Spanish coalition in support of the American rebellion. France and Spain harassed British shipping and conducted military operations on both sides of the Atlantic during the latter part of the war.[29]

Washington marched his army out of Valley Forge in the spring of 1778 searching for redcoats. He found them at Monmouth Court House, New Jersey on 28 June. The battle has been called a draw and of no tactical or strategic importance by some historians. This sand table opinion, theoretical and dissociated from the battlefield, yearns for revision. At the Battle of Monmouth, for the first time, Washington engaged British forces in the traditional European style of battle. After a grueling artillery duel, it was the American army that remained on the battlefield. The British also took much greater casualties than the Continentals. Perhaps there was no tactical or strategic importance, but Washington's troops did not see it as a draw. A marked change in the character, determination, and condition of the Continental Army had been forged in a small Pennsylvania valley in the winter of 1778. That change was evident at Monmouth Court House, and it would spread throughout the army.

MEDICAL SUPPORT IN THE SOUTHERN THEATER

Monmouth was the last large engagement in the northern theater. Smaller battles would continue there and on the western frontier against tribes of the Iroquois nation in league with the British. But in the last days of 1778, the British took the war south hoping Loyalists in the Carolinas, Georgia, and Western Florida (Western Florida began at Pensacola, included the lower third of Alabama, and most of Mississippi) would join royal forces to crush the rebellion.

Savannah was captured on 29 December after an engagement that cost Brigadier Benjamin Lincoln half of his men in killed, wounded, and captured. In September 1779, a combined Franco-American force put Savannah under a month-long siege that resulted in failure and nearly 1,000 casualties. The following spring, British forces marched north and put Charleston, South Carolina under siege from 1 April to 12 May 1780. General Lincoln's surrender condemned 6,684 soldiers to British prisons. This was followed by General Horatio Gates' disastrous defeat at Camden on 16 August and his replacement by General Nathaniel Greene.

At this time, the poverty of success on the battlefield was reflected in the poverty of medical support to southern forces. In the Southern Theater, medical support was divided into three areas – Virginia, the Carolinas, and Georgia – of which only Virginia was part of the Hospital Department under Deputy Director William Rickman. Historian Mary Gillette noted, "In the Carolinas and Georgia … two separate systems, one centered about Charleston, South Carolina, and the other covering North Carolina, gradually emerged, independent both of the Hospital Department and of each other."[3]

On 22 March 1780, the reorganization of the Hospital Department by Congress recognized military hospitals south of Virginia. Doctor David Oliphant of Charleston was appointed Deputy Director with Doctor N. Brownson as Deputy Purveyor, Doctor Peter Fayssoux, Chief Physician of the Hospital, Doctor James Brown, Chief Physician of the Army, and Doctors Robert Johnson and William Reed as Hospital Physicians.[22] However, Congress failed, once again, to describe the relationship of those facilities to the larger Department. Another year passed before the new Hospital Department Director General John Cochran took responsibility for southern military medical facilities. (Shippen resigned 3 January 1781.. Even then South Carolina congressmen opposed subordinating their state system to the Hospital Department.[3]

Although medical care in the Southern Theater has been called "haphazard, lacking organization and physicians," the dedicated service of the southern physicians involved should not be discounted or disparaged.[3] Doctor Oliphant had operated a hospital for "State troops, Militia, Sailors and Negroes in the public Service" since June 1776. Oliphant's organization likely included the doctors mentioned above and Dr. Hugh Williamson. However, these medical facilities suffered a severe reverse when General Lincoln surrendered Charleston. Physicians were incarcerated along with soldiers and the British were not particularly cooperative in assisting with health care. Although Oliphant, Williamson, Fayssoux, and others were paroled in the winter of 1781, most of the medical care was still provided by regimental and militia surgeons. And the same issues – large numbers of sick, shortage of supplies and medicines, scant Congressional funding – plagued all physicians and surgeons concerned.[3]

The stunning victories at King's Mountain on 7 October 1780 and at Cowpens on 17 January 1781 raised American morale tremendously. The following engagement at Guilford Courthouse, North Carolina on 15 March 1781 has been called a technical victory for British General Charles Cornwallis because General Nathaniel Greene retreated off the field. It was . Pyrrhic victory at best. In chasing

Greene deep into North Carolina rather than marching to Virginia, Cornwallis extended his supply line too far. Now with heavy losses, short food and shelter, Cornwallis began the long march to Yorktown.[30]

VICTORY AND THE DISSOLUTION OF THE HOSPITAL DEPARTMENT

On 19 October 1781, a mortified General Lord Charles Cornwallis sent an aide to surrender to General Washington after his defeat by a combined American and French army. The British military band supposedly played *The World Turned Upside Down* during the surrender. Although the Treaty of Paris would not be signed until 3 September 1783, our War for Independence was over, and the United States was recognized as a sovereign nation.

Even before this event, the penurious Pennsylvania Senator and dominant voice in Congress, Robert Morris, had reduced funding to the Hospital Department in 1780. Many veteran medical officers, unpaid for nearly two years and reduced by new legislation to the more equitable title of Hospital Physician and Surgeon, resigned. Director General John Cochran's efforts to obtain replacements were denied. Moreover, he had received orders from Congress to begin closing hospitals. Yellow Springs, Pennsylvania, Albany, and Boston facilities were first on the list. By the fall of 1783, the army was in camp at Newburgh, New York, and being dismantled by Washington. Cochran did the same with the Hospital Department. By the end of the year, only Doctors William Eustis and Samuel Adams, Jr. with two mates constituted the entire medical staff in the north.[31]

The Continental Army and its Hospital Department were no more.

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Smallpox in the Colonial Army: Washington's Revolutionary Dilemma

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ABSTRACT:

The health of the Continental Army was of paramount concern to Washington as he developed strategies for fighting and winning the War of Independence. Smallpox had the potential to decimate his army, and while it could also impact the British forces and their allies, the Continentals appeared to be much more susceptible due to decreased exposure to the disease in the rural colonies as compared to the more urbanized areas in England, where people were more likely to have been exposed early in life and developed immunity. Multiple techniques of smallpox inoculation had been practiced in the colonies for decades and were well understood, but all involved substantial risk both for the person being inoculated and, more significantly, for others in the area. Inoculation had a reputation as a "super spreader" activity, to use a 21st Century term, as the inoculated person would be infected with a mild case of smallpox that could spread to others and cause more severe symptoms or death. Washington had a difficult decision – accept the risk of smallpox spreading through natural means, using whatever mitigation methods were available, or undertake an inoculation program with the potential benefit of ubiquitous immunity but the risk of a catastrophic outbreak. This article examines that decision, considering the prevalent views of inoculation in the 18th Century, advice from medical professionals like Benjamin Rush and William Shippen, and Washington's personal experience with smallpox in his youth. This analysis of Washington's decision process regarding smallpox inoculation will help today's decision-makers grapple with the complexities of managing military healthcare to conserve the fighting strength.

INTRODUCTION

Leadership hinges on decisions about risks and benefits, people and perceptions, tactics and strategies, and countless other balances. In the first years of his command of the Continental Army, George Washington faced a constant flow of crucial decisions with immeasurable consequences. His task, one that he had not sought and for which he felt unqualified, was daunting: transforming a poorly equipped and inadequately trained militia into an army capable of defeating the most powerful military force in the world. And while his focus was undoubtedly on the threat posed by the British military, another threat loomed with the potential to destroy his army without the need of a single British musket ball or bayonet. This invisible, unpredictable, and terrifying threat was smallpox, a disease Washington had suffered and survived as a young man.

Washington's decision to inoculate his army in 1777 stands as one of the most consequential, yet often overlooked, actions of his leadership during the Revolution. Faced with a growing crisis, he made the bold and risky choice to incorporate inoculation in his overall military strategy, despite the uncertainties surrounding its implementation and the potential for widespread contagion. His decision was not only a matter of military necessity but also one of public health innovation, requiring a careful balance of medical knowledge, military strategy, and public sentiment.

This essay explores Washington's decision to inoculate the Continental Army, examining the context of smallpox in the 18th Century, the challenges the disease posed military strategists, and the factors that influenced Washington's actions. It also explores the execution of the inoculation campaign, the outcomes of this decision, and its lasting impact on both military medicine and public health. By understanding this pivotal moment in history, we can gain insight into Washington's leadership and his ability to make difficult strategic decisions in times of crisis.

"The Small Pox is ten times more terrible than Britons, Canadians and Indians together."[1] So wrote John Adams to his wife Abigail in June 1776, regarding the disastrous retreat from Quebec after the Continental Army under Benedict Arnold was stricken with epidemic smallpox. Adams' fears were not unfounded, nor was the risk exaggerated. Smallpox was one of the deadliest diseases on earth in the 18th Century, and the American colonies were in the throes of a widescale epidemic. Particularly in the Quebec campaign at the end of 1775, where combat losses were far fewer than losses to disease and non-battle injuries, the impact of smallpox was staggering and forced the ignominious retreat of the Continental Army. The situation was so dire that sick men who could not keep up with the retreating army were left to die in the wilderness. While statistics for this period are problematic, reasonable estimates indicate that over the course of the war about twice as many colonial soldiers would die of disease than of combat injuries, and a significant portion of these losses would be due to smallpox.[2] Dr. James Tilton, an army physician who later served as Surgeon

General during the War of 1812, estimated that "we lost not less than from ten to twenty of camp disease, for one by weapons of the enemy."[3]

Smallpox had killed, blinded, and disfigured humans for millennia. Mummies buried 10,000 years ago bear signs of the disease.[4] The disease is caused by the variola virus, with symptoms that include high fever, joint pain, fatigue, and a characteristic rash that turns into painful pustules. As a communicable disease, smallpox spread quickly through populations, especially in crowded and unsanitary conditions such as military camps and urban areas. In a time before vaccines and antibiotics smallpox was a fearsome killer, equally impacting people of all social strata, of all ages, and of all races.[5]

Smallpox affected millions in devastating outbreaks around the world during the 18th Century. In Europe alone smallpox killed 400,000 people each year, and one third of the survivors went blind. The case-fatality rate varied from 20% to 60% and left most survivors with disfiguring scars.[6] The virality and lethality of the disease ebbed and flowed over time, and in the decades leading up to 1775 it had become progressively more dangerous.[7] In the early 18th Century the western world was introduced to an inoculation technique called variolation by Lady Mary Wortley Montagu, the wife of England's ambassador to the Ottoman Empire who observed the practice in Constantinople, and almost simultaneously by Cotton Mather, a Massachusetts minister who learned of the technique from an African man named Onesimus whom Mather held as a slave.[7] This technique of inoculation involved "ingrafting" disease material from a smallpox victim into an incision in a healthy person, generally resulting in a milder form of the disease that was far more survivable than natural infection but conferred the same lifelong immunity. But variolation was no panacea – two to three percent of those inoculated would still die, and even those whose symptoms were mild could easily spread the infection through contact with non-immune people who would suffer the much harsher and more dangerous natural form of the disease.[6] The duration of the infectious period was uncertain, quarantine was difficult and costly, and epidemics often grew from these inoculation efforts. These risks led to inoculation being illegal in various jurisdictions in the colonies, and in some cases violent altercations erupted around efforts to inoculate.

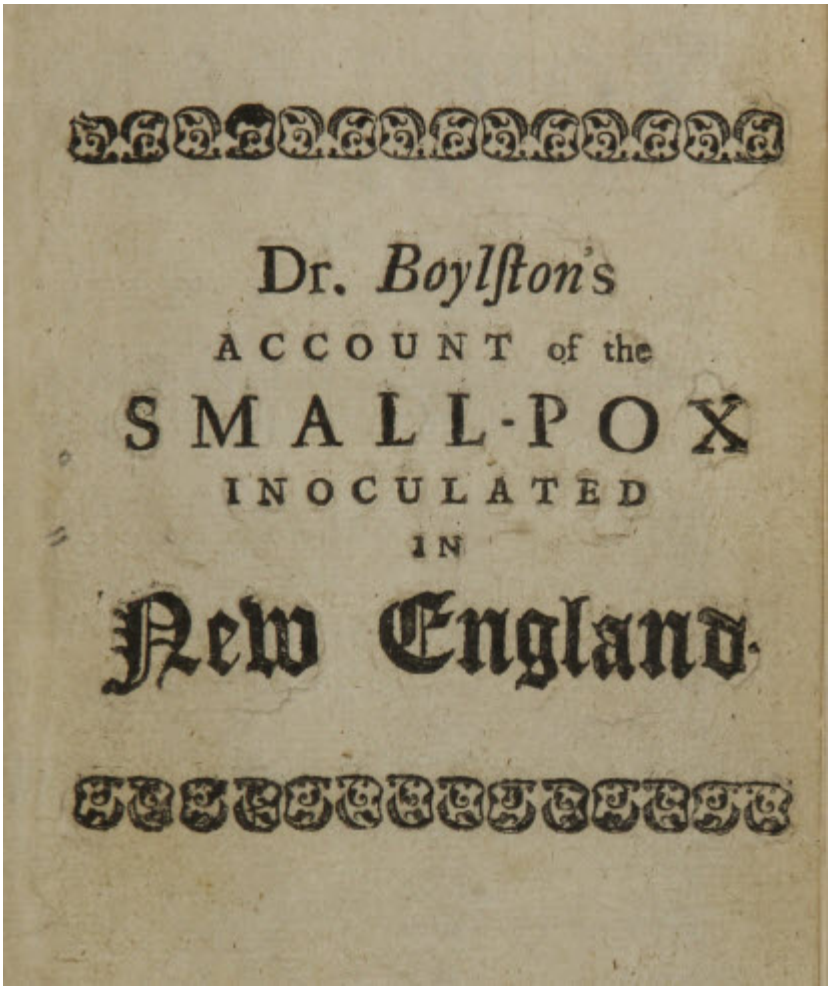
After learning about variolation from Onesimus in 1716 Cotton Mather convinced Zabdiel Boylston, a Boston physician, to inoculate his 6-year-old son and two enslaved people using the technique during a smallpox outbreak in 1721. The experiment worked, and Boylston conducted several other successful trials soon after, eventually concluding that about one of every 46 inoculated patients would die – a far better survival rate than observed in natural infections.[8] But despite the evidence Boylston presented,

Fig. 1 Cotton Mather, who introduced smallpox inoculation to the American Colonies in 1721.

public outrage took over as people grew concerned about both religious and public health aspects of the new technique. Mather noted in his diary that "the Destroyer" seemed to have taken possession of people: "They rave, they rail, they blaspheme; they talk not only like Ideots [sic] but also like Franticks [sic]."[9] Throughout the century inoculation faced significant opposition from both the public and the medical community, with cities like Boston establishing regulations that either forbade the practice or set strict conditions under which it could be performed.

In the American colonies smallpox was a constant threat, both to civilian populations and to military forces. Early American settlers often had no immunity to the disease, which had been introduced to the New World by European explorers and colonizers. Smallpox outbreaks were common, often resulting in significant loss of life in the burgeoning communities. Between 1736 and 1782 there were frequent smallpox epidemics across the colonies, with a particularly devastating epidemic spreading across the entire North American continent from 1775 to 1782.[7] When a smallpox outbreak struck a community it would likely spread to 60%

Fig. 2 Title page of Dr. Zabdiel Boylston's book extolling the benefits of variolation, 1730.



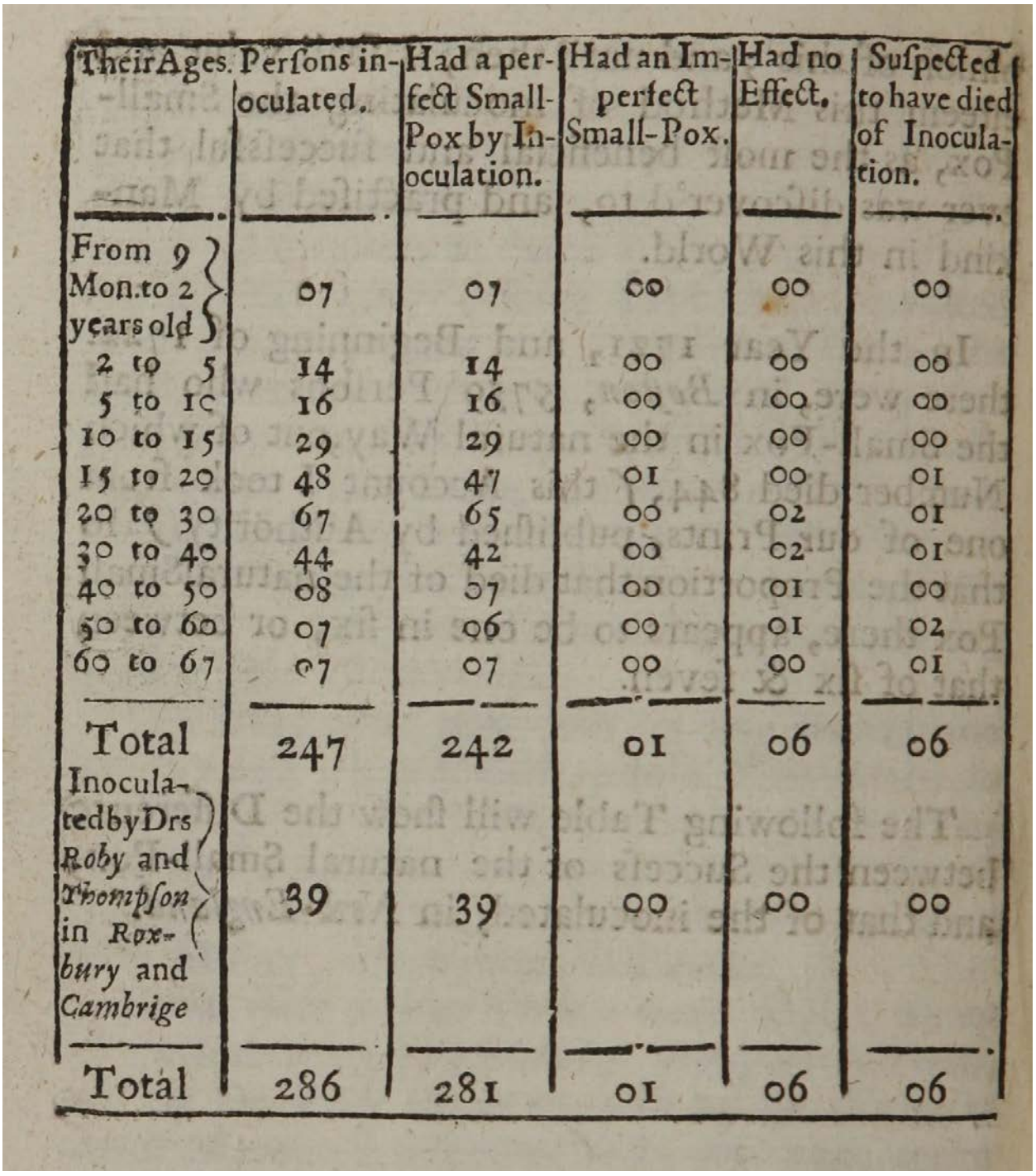
or more of the population.[10] While the outbreaks and epidemics were universally catastrophic, the responses varied widely based on regional proclivities. Major urban areas like Boston, Philadelphia, and New York might see the necessity of organized inoculation to protect public health, but in most cases the colonial governments would take a more conservative approach to mitigating the threat, relying on quarantine and isolation instead of inoculation.

Smallpox was on Washington's mind from the beginning of his command in 1775. In the corpus of his Revolutionary War correspondence Washington mentions smallpox no fewer than 132 times.[11] In his general orders issued 4 July of that year, his second day in command of the Continental Army camped outside Boston, Washington included the directive "No Person is to be allowed to go to Fresh-water pond a fishing or on any other occasion as there may be danger of introducing the small pox into the army."[12] (Fresh Pond was the site of a smallpox hospital a short distance from Washington's headquarters in Cambridge.) The subject of smallpox and its strategic implications would come up again and again as he struggled to maintain the health and strength of his army. It presented a terrible dilemma: there was no effective treatment for smallpox, and an infected soldier would be incapacitated for weeks, or even permanently, if he survived at all. Inoculation offered an effective and relatively safe means of prevention but would still leave soldiers incapacitated in strict quarantine for extended periods, and inadequate quarantine could lead to an epidemic with the potential to decimate his entire army.

The British generals also had to grapple with smallpox and the question of inoculation, but the decision was easier for them and carried less risk. Since a substantial portion of the British population had previous exposure to smallpox, having grown up in cities like London where the disease was endemic and outbreaks were frequent, many of the British soldiers had natural immunity.[7] London had also established a Smallpox and Inoculation Hospital in 1746, providing free inoculation for hundreds of poor Londoners each year. Identifying, inoculating, and quarantining the small percentage who had not already been inoculated or survived an infection made obvious strategic sense and was relatively simple to accomplish. Unlike in the Continental Army, where most soldiers had no natural immunity, the limited scope of an inoculation effort meant that even if the planned quarantine failed for some reason the results would not be catastrophic for the British forces.

With fewer large cities and a more widely dispersed population, the risk and severity of epidemics had been lower in the colonies than in Britain and Europe. The benefit of organized inoculation efforts in the American colonies was often perceived as not worth the risk of having inoculated patients spread the disease to non-immune neighbors. And, as Cotton Mather had lamented, there was a popular religious argument that inoculation interfered with the will of God, exemplified by the Reverend Edmund Massey publishing "A Sermon Against the Dangerous and Sinful Practice of Inoculation" in London, with the pamphlet reaching a wide audience in colonial cities and sparking a debate that would persist for decades.[13] This debate, described by Boston minister William Cooper in his "Letter to a friend in the country" in 1730, found a mix of medical professionals and theologians on each side of the controversy.[14] The inoculation hesitancy was not without merit; it was bolstered by cases like that of a popular preacher and philosopher named Jonathan Edwards who, having just been appointed president of the College of New Jersey (later Princeton University), died of smallpox after an inoculation in 1758.[15] Such events captured the headlines and cast long shadows of fear over the idea of inoculation throughout the colonies. Nevertheless, some

Fig. 3 Table from Boylston's book (pg. 34) showing that out of 286 inoculations, six people had died of smallpox infection suspected to be brought on by the procedure



Their Ages.	Persons inoculated.	Had a perfect Small-Pox by Inoculation.	Had an Imperfect Small-Pox.	Had no Effect.	Suspected to have died of Inoculation.
From 9 Mon. to 2 years old	07	07	00	00	00
2 to 5	14	14	00	00	00
5 to 10	16	16	00	00	00
10 to 15	29	29	00	00	00
15 to 20	48	47	01	00	01
20 to 30	67	65	00	02	01
30 to 40	44	42	00	02	01
40 to 50	08	07	00	01	00
50 to 60	07	06	00	01	02
60 to 67	07	07	00	00	01
Total	247	242	01	06	06
Inoculated by Drs *Roby* and *Thompson* in *Roxbury* and *Cambrige*	39	39	00	00	00
Total	286	281	01	06	06

colonial leaders and physicians were convinced of its value, including Benjamin Franklin, who had lost his four-year-old son Francis to smallpox in 1736.[16] John Adams was another supporter, having been inoculated himself in 1764, and having his wife and children inoculated in 1776. Their advocacy kept variolation in the zeitgeist, though public skepticism limited its implementation.

IMPACT OF SMALLPOX ON MILITARY READINESS IN THE CONTINENTAL ARMY

The presence of smallpox in the Continental Army had devastating effects. When Washington assumed command in 1775, the Continental Army was composed mostly of poorly trained militias and volunteers who had little discipline and no understanding of military sanitation and hygiene principles. In addition to the logistical challenges of organizing

and supplying an army, Washington had to contend with the constant threat of smallpox and other diseases that affected combat readiness. Disease outbreaks could quickly render entire units combat ineffective, depleting their numbers and leaving the remaining soldiers too weak to fight.

During the Siege of Boston in 1775, Continental soldiers occupied the heights around the city while smallpox raged among the besieged population. William Howe, the British general commanding the redcoats who held the city, attempted to contain the epidemic among the civilians under his control through inoculation. He sometimes released these freshy inoculated citizens into the countryside, ostensibly offering safe passage so that they could recover in the fresh air outside the city, but also risking the spread of the disease to the surrounding countryside, including to Washington's army in their siege encampments. On 27 November 1775 Washington wrote to Lieutenant Colonel Joseph Reed:

> *"By order of Genl Howe, 300 of the poor Inhabitants of Boston were landed on Saturday last at point Shirley, destitute almost of every thing… Yesterday in the Evening I receivd information that one of them was dead, & two more expiring; & the whole in the most miserable & piteous condition—I have order'd Provision to them till they can be remov'd, but am under dreadful apprehension's of their communicating the small Pox as it is Rief in Boston—I have forbid any of them coming to this place on that Acct."*[17]

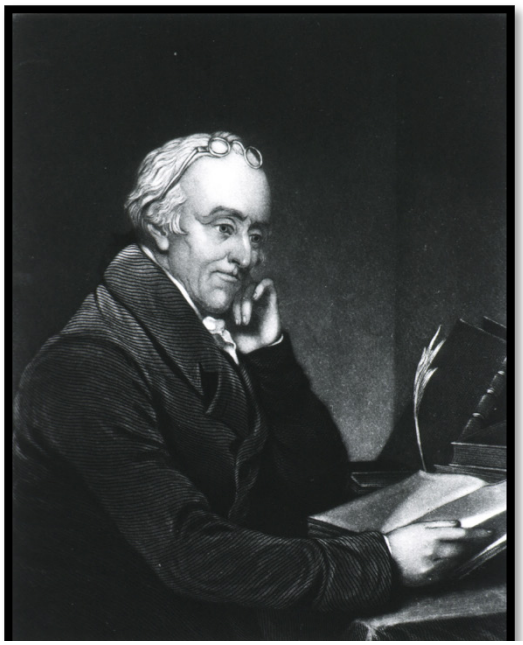
This was Washington's first opportunity to confront the disease as the army's commander, and the first time he grappled with the decision to inoculate or not. It was an enormously challenging dilemma – a naturally occurring epidemic within the ranks could easily weaken his army to the point of combat ineffectiveness and force them to abandon the siege. Inoculating the entire army was preferable, but would incapacitate the soldiers for weeks, and the British would surely exploit such a vulnerability. It might be possible to conduct a piecemeal inoculation campaign, but controlling the spread of the disease from inoculated soldiers to non-immune troops would be difficult and could spark a worse epidemic than would occur by doing nothing at all. After consulting his trusted advisors and weighing the options, Washington decided inoculation in the camps surrounding Boston was too risky. He issued orders focused on prevention through quarantine, isolation, and discipline, the first of several occasions when the weight of the inoculation decision pulled him toward less aggressive control measures.

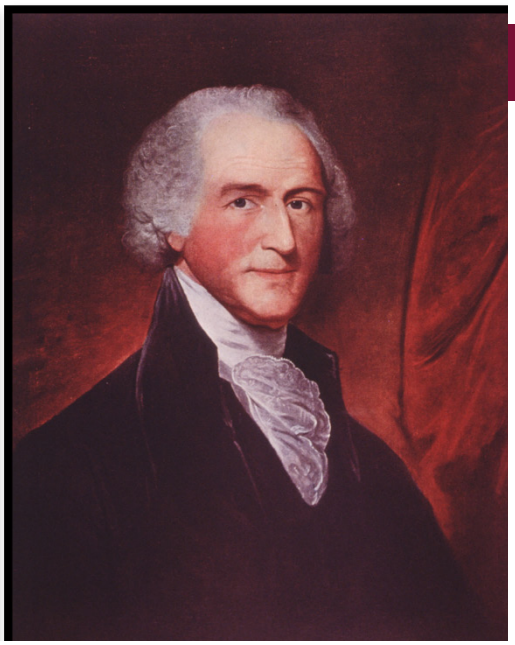
The preventative measures were marginally effective throughout the winter, but by the spring of 1776 when General Howe and the British forces abandoned Boston and sailed for Nova Scotia, smallpox outbreaks were again on the rise. Infections spread rapidly among soldiers and civilians alike, and the disease again posed a major obstacle to the Continental Army's readiness. In addition to the loss of life and the incapacity of soldiers, smallpox outbreaks severely affected morale and confidence among the troops, already fragile due to inadequate provisions and the months-long siege. The threat was compounded by the ease with which smallpox could be transmitted, not only by direct contact but even through simple proximity, increasing the potential for widespread contamination in close-quartered military settings.

Fig. 4 Smallpox pustules, 1898.

Washington left two regiments under General Artemas Ward to guard Boston as he led the rest of the army south to New York in April 1776, shortly after the British sailed out of Boston Harbor. As civilians who had fled the city during the occupation flooded back, smallpox spread among them. The Boston selectmen had banned inoculation, fearing it would lead to an outbreak, but on July 3, at the urging of Dr. John Morgan and other respected physicians, they lifted the ban for 12 days and encouraged the people of Boston to get inoculated. General Ward took the opportunity to get the regiments under his command inoculated, joining approximately 5,000 civilians who undertook the procedure when it

Fig. 5 Benjamin Rush (left) and William Shippen, Jr., two of the influential physicians who advised Washington to inoculate the Army.





THE DECISION TO INOCULATE

George Washington had personal experience with smallpox and was well aware of the harm it could cause. He had survived a debilitating bout of the disease himself at the age of 19; the illness left him bedridden with fevers and excruciating pain for nearly a month. Washington also recognized how beneficial inoculation could be if managed correctly; he had permitted his adopted son John Parke Custis to be inoculated in Baltimore in 1771, and his beloved Martha had undergone the procedure in 1776. He had witnessed firsthand the devastating effects of disease on his troops, and as a military leader, he understood that his soldiers needed to be healthy to fight effectively. Washington had famously advocated for medical support for the army from the beginning, with much of his correspondence expressing concerns about the health and welfare of the troops. Yet he also faced the challenge of balancing military necessity with the resources available to him, which were limited both in terms of medical knowledge and infrastructure.

was offered.[7] Other commanders had conducted small-scale inoculation efforts like this since military operations began a year earlier, but prohibitions on the practice were more common. In units where the procedure was banned soldiers would often seek inoculation in secret as a means of self-preservation, risking court martial and severe punishment if they were caught. Such haphazard and uncoordinated actions without proper quarantine would lead to additional infections, but the disease was so feared that vulnerable soldiers would do whatever they could to protect themselves. Inaction was as great a risk as inoculation.

Washington and his commanders were deeply concerned about the risk of further outbreaks. By late 1776 hundreds of Continental Army soldiers had died of smallpox and many more had been incapacitated, some for weeks and some permanently, and it was clear that the trend would continue unless a solution could be found.[18] Washington and his advisors considered an inoculation campaign again at this time, but once again they determined that they could not accept the risks, falling back on a stringent quarantine policy instead. He wrote from New York to Jonathan Trumbull on 7 July 1776:

> *"I should suppose, if proper precautions are taken, the Small Pox may be prevented from spreading. This was done at Cambridge, and I trust will be continued by Generals Schuyler and Gates who are well apprized of the fatal consequences that may attend its infecting the whole Army. But a small part of the Forces here have had it."*[19]

Unfortunately, the coming months would show this supposition to be overly optimistic.

Medical knowledge about the spread of infectious diseases was inadequate and problematic in Washington's time. The notion of germs and germ theory would not be accepted by the medical community until a century later. Ideas about transmission of disease centered on miasma, or "bad air." This was not entirely wrong in the case of smallpox, which can be spread through the air by inhaling microscopic respiratory droplets from an infected person, but it was not an accurate enough understanding to allow for scientifically effective preventive measures. As one 20th Century historian has noted, despite the advances in medical knowledge during the 18th Century, "sanitary control was still based on an insufficient body of biologic and medical fact."[20] There was no effective cure and truly safe vaccines (derived from the cowpox virus) would not be available until the end of the 18th Century, so quarantine and inoculation through variolation were the only tools available for managing smallpox. The challenges and unpredictability of these techniques led many commanders and soldiers to

ignore them or apply them inconsistently, often with terrible outcomes.

Even in the colonies where vocal opponents to inoculation persisted, the medical profession had largely come down in favor of the preventive measure by the time of the Revolution. In 1776 Dr. John Morgan published in Boston a brief but influential treatise called *A Recommendation of Inoculation According to Baron Dimsdale's Method,* and inoculation hospitals began to appear where allowed. After consulting with his trusted medical advisors during the opening weeks of 1777, including Dr. Benjamin Rush, a prominent physician and early advocate of inoculation, and Dr. William Shippen, Director of Hospitals for the Continental Army, Washington was finally convinced that the time had come for organized inoculation of the army. Rush and Shippen had both argued that the long-term benefits of immunity would outweigh the risks, especially given that smallpox outbreaks continued to wreak havoc despite valiant prevention efforts. Orders prohibiting inoculation had been ignored by soldiers desperate to protect themselves, demonstrating a sort of rebellious advocacy in favor of inoculation. Doctors were complicit in this defiance, including James Thacher, who stated in his war diary that in May 1776, "though contrary to general orders," he received an inoculation from his friend Dr. John Homans and "passed through the disease in the most favorable manner, not suffering one day's confinement."[21] Additionally, Washington's political acumen led him to understand that the survival of the army was not just a matter of military strategy but also of public perception. If the army continued to be decimated by smallpox, public support of the war effort might falter.

Thus, on 5 February 1777, Washington reached the crucial decision to inoculate all non-immune soldiers in his army, writing to John Hancock:

> *The small pox has made such Head in every Quarter that I find it impossible to keep it from spreading thro' the whole Army in the natural way. I have therefore determined, not only to innoculate all the Troops now here, that have not had it, but shall order Docr Shippen to innoculate the Recuits as fast as they come in to Philadelphia.*[22]

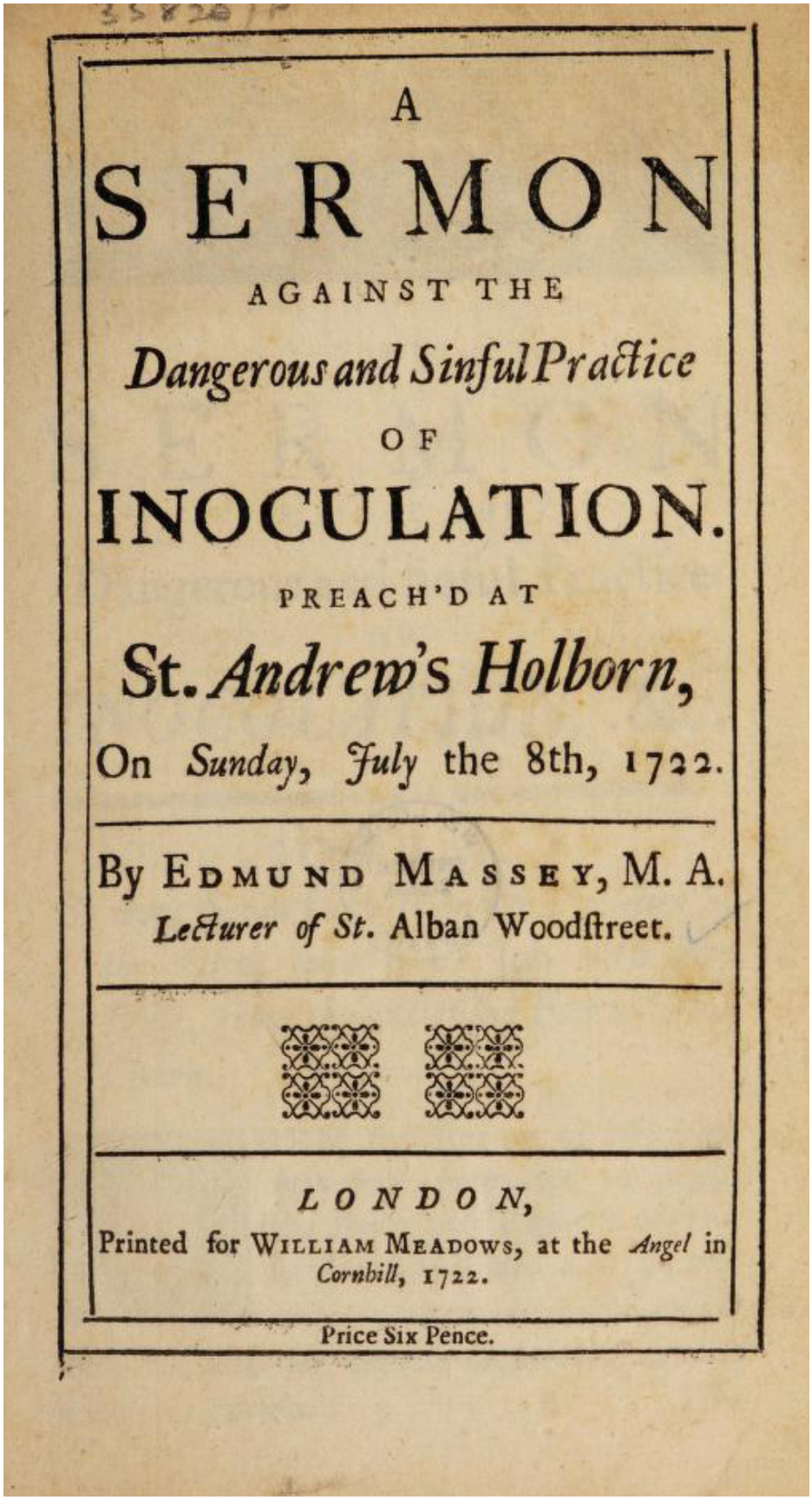
It was an immense strategic risk, one that could have disastrous consequences if it went wrong, but it was a necessary gamble for the survival of the cause. Writing to Dr. William Shippen, Jr., the next day, Washington informed his senior medical officer,

Fig. 6 Nursing in the Revolutionary War, image from *The Army Nurse*, published by the U.S. Army Nurse Corps, 1944.

> *"Finding the Small pox to be spreading much and fearing that no precaution can prevent it from running through the whole of our Army, I have determined that the troops shall be inoculated. This Expedient may be attended with some inconveniences and some disadvantages, but yet I trust in its consequences will have the most happy effects. Necessity not only authorizes but seems to require the measure, for should the disorder infect the Army in the natural way and rage with its usual virulence we should have more to dread from it than from the Sword of the Enemy."*

Having explained his decision, though that was hardly necessary since Shippen had been a vocal supporter of inoculation, Washington continued with a plan of attack:

Fig. 7 Reverend Edmund Massey's *Sermon Against the Dangerous and Sinful Practice of Inoculation,* 1722.



A

SERMON

AGAINST THE

Dangerous and Sinful Practice

OF

INOCULATION.

PREACH'D AT

St. *Andrew's Holborn,*

On *Sunday, July* the 8th, 1722.

By EDMUND MASSEY, M. A.

Lecturer of St. Alban Woodstreet.

LONDON,

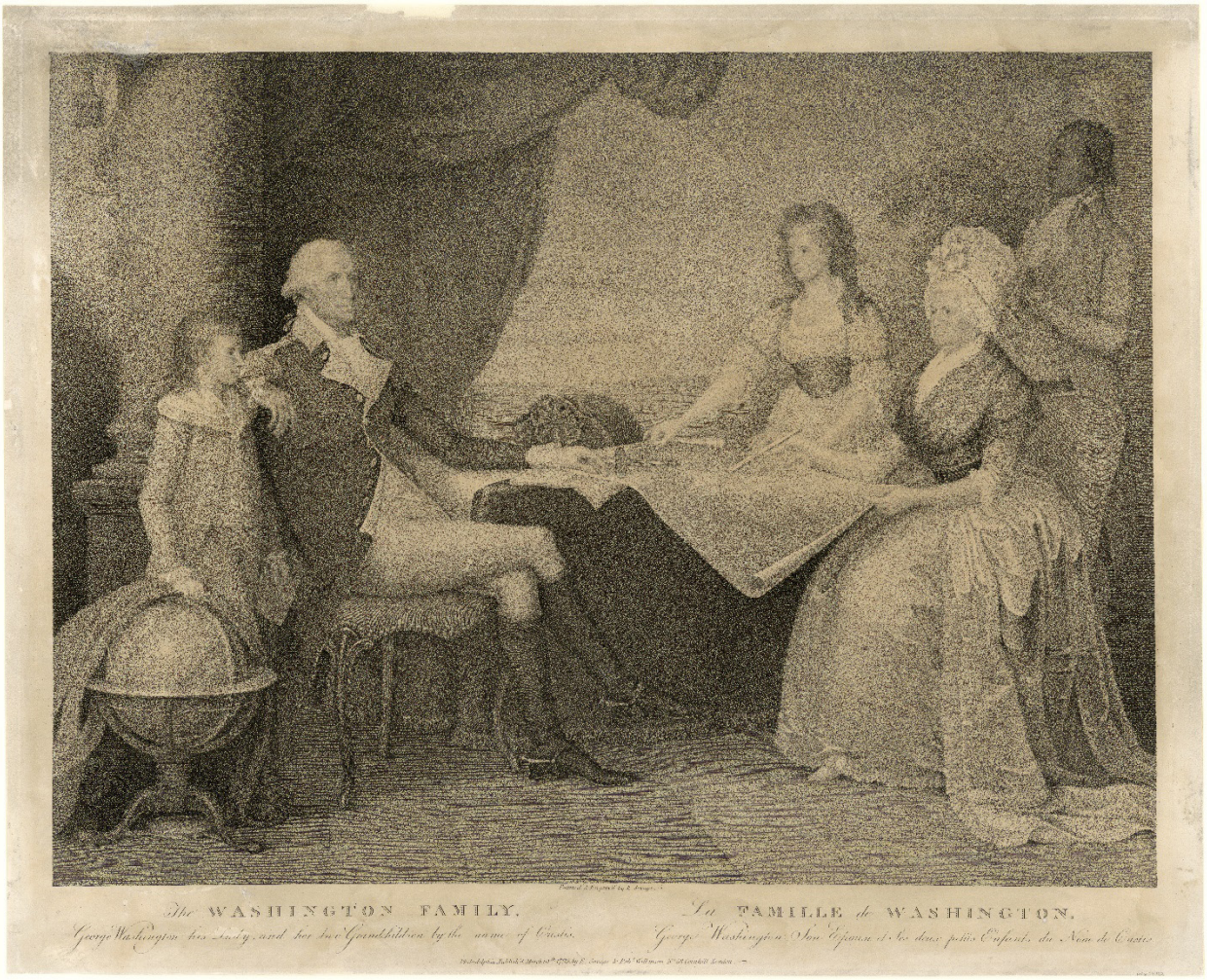
Printed for WILLIAM MEADOWS, at the *Angel* in *Cornhill,* 1722.

Price Six Pence.

"Under these circumstances I have directed Doctor Bond to prepare immediately for inoculating in this Quarter, keeping the matter as secret as possible, and request that you will without delay inoculate All the Continental Troops that are in Philadelphia and those that shall come in as fast as they arrive. You will spare no pains to carry them through the disorder with the utmost expedition, and to have them cleansed from the infection when recovered, that they may proceed to Camp with as little injury as possible to the Country through which they pass. If the business is immediately begun and favoured with the common success, I would fain hope they will be soon fit for duty, and that in a short space of time we shall have an Army not subject to this the greatest of all calamities that can befall it when taken in the natural way."[23]

With the decision made and the initial orders issued, Washington proceeded with incremental steps to achieve army-wide immunity to smallpox. Shippen would ensure that new recruits who did not have smallpox immunity through previous infection or inoculation would be inoculated in Philadelphia before joining their units. Following that, he ordered that any soldiers who had not previously contracted smallpox be inoculated at several camps, most notably at Morristown and Valley Forge, while simultaneously admonishing commanders in every state to maintain secrecy in the operations. In April 1777, after Washington prevailed upon Virginia governor Patrick Henry to lift that state's prohibition on inoculation,[24] Dr. James Tilton established a second inoculation station in Dumfries, Virginia, to inoculate recruits from the South as they

Fig. 8 George and Martha Washington with their grandchildren and an enslaved man, 1798. George Washington had survived a smallpox infection in his youth; adopted son John Parke Custis had been inoculated in 1771, Martha Washington in 1776.



entered service. Every step, every order, was carefully weighed and considered. It was obvious that if soldiers were to become sick, it was better to have them exposed to the disease in controlled settings rather than to risk outbreaks spreading uncontrollably throughout the ranks. Successful implementation of the inoculation plan hinged on controlling the virus and the soldiers who carried it. Inoculation might cause as many sick as an outbreak, but Washington could choose the place and time of inoculation, reducing the risk.

While Washington and his medical leaders were committed to the decision, the process was far from simple. Inoculation required considerable logistics and infrastructure, as soldiers had to be isolated in safe areas where they would not spread the disease to others. Medical staff had to be trained, and soldiers had to be quarantined for weeks while they recovered. The procedure itself carried significant risks and could be unpredictable, as not all individuals survived the inoculation, and some could develop severe forms of the disease, potentially infecting others in the process. Perhaps most important from a military readiness perspective, the soldiers who were under quarantine were not available to fight and many of the immune soldiers had to be dedicated to caring for them, meaning that a significant portion of the unit undergoing inoculation was sidelined. Secrecy was imperative, as there would be little Washington could to do avoid a complete rout if the British attacked while the army was in such a weakened state.

IMPACT AND OUTCOMES OF INOCULATION

Historians consider the decision to inoculate the Continental Army to be one of Washington's most farsighted and effective military strategies.[25] By the summer of 1777, although the smallpox epidemic continued to devastate civilian and native populations, the majority of the army was immune to the disease and subsequent outbreaks had a minimal impact on combat capability. In regard to medical readiness, the inoculation campaign put the Continental forces on equal footing with their enemy. With the dangers of smallpox mitigated, Washington was able to pursue a more aggressive military strategy without worrying about the possibility

of repeating the Quebec disaster of the previous year. The widespread inoculation campaign also fostered a sense of unity and increased morale among the soldiers, who saw in Washington's leadership a direct response to their needs. Following the inoculation campaign Washington was able to maintain a capable force that successfully pressured the British forces through the remaining years of the war, ultimately achieving victory with Cornwallis's surrender at Yorktown in 1781.

WASHINGTON AS A PUBLIC HEALTH INNOVATOR

Washington's decision to inoculate the Continental Army had far-reaching impacts. While smallpox was still a threat in the years following the Revolution, his bold but deliberate approach to disease control—marking the first time an entire army was immunized for a contagious disease by order of the Commanding General—set a precedent for leaders in both military and civilian roles. [26] His willingness to listen to his medical advisors and embrace a risky but promising medical technique underscored his leadership skills not just in war, but also in managing public health crises. Moreover, Washington's decision highlighted the importance of science and medicine in military strategy, marking an early example of how health interventions could influence the course of history.

The success of inoculation at the scope pursued in the Continental Army also contributed to the eventual widespread adoption of vaccination as a tool for public health. When the first vaccine was developed by English physician Edward Jenner in 1798, the public was more ready to accept the scientific advance and get vaccinated because they had seen the positive impacts of these earlier inoculation efforts. The practice spread quickly through Europe, and the following year Dr. Benjamin Waterhouse had some of Jenner's vaccine material shipped to the United States. Within a few months vaccinations were becoming common in Boston, Philadelphia, and New York; Thomas Jefferson had his family and friends vaccinated in Washington, D.C.[6] Further advances in vaccination over the next two centuries continued to build upon this foundation of public acceptance and understanding. Washington's decision was an important step in the evolution of medical practices in the military and beyond.

CONCLUSION

George Washington's decision to inoculate the Continental Army against smallpox was one of the most significant and far-reaching decisions of the Revolutionary War. In the face of a deadly disease that threatened to destroy his forces, Washington took an incremental, open-minded approach to the decision, twice testing less aggressive prevention efforts and finding them insufficient before finally determining to accept the risk of widescale inoculation. His patience provided the time and opportunity to ensure that Congress, the public, and his soldiers would support his decision, and ultimately the risk paid off and contributed to the Continental Army's success against the British. His leadership not only ensured the survival of his army but also set a precedent for the integration of medical practices into military strategy. By embracing inoculation and taking the time to hear and understand the recommendations of his medical advisors, Washington not only protected his troops but also helped lay the groundwork for future public health interventions. His legacy as a leader who understood the importance of science, medicine, and pragmatism in times of crisis continues to resonate in the history of both military operations and public health.

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Fig 1. "Andrew Craigie at Bunker Hill" by Roberth Thom .Andrew Craigie (center) kneels with a vial held firmly in his left hand, a medicine chest at his right. This is one of the Robert Thom paintings from the Great Moments in Pharmacy series. Originally commissioned by Parke Davis the collection was donated to the American Pharmacists Association Foundation in 2009.

Apothecaries in the American War of Independence

Dennis B. Worthen, PhD

On April 30, 1775, in the aftermath of British military advances on Concord and Lexington, the Massachusetts Provincial Congress and its Committee of Safety and Committee of Supplies appointed Andrew Craigie "to take care of the medical stores, and to deliver them out as ordered by this committee."[1] This appointment began a remarkable series of events forming the basis for more than 250 years of military pharmacists conserving the health of America's fighting forces. A few weeks after this appointment, on June 17, Craigie assisted physician David Townsend in treating wounded Massachusetts militiamen during the Battle of Bunker Hill.

On July 4, the Third Massachusetts Congress appointed Craigie the medical commissary and apothecary of the Massachusetts Army. On July 14, the Committee of Safety resolved that "Commissary Craigie be desired to procure, at the expense of the colony, such medicines as may be immediately and absolutely necessary; in consequence of which, the following order was given to Craigie: You are hereby desired immediately to supply the store under your care, with such medicines as are absolutely necessary for the present relief of the sick in the army."[2] These directives marked the introduction of Andrew Craigie to American history and the first appointment of a military pharmacist in America.[3]

Little is known of Craigie's educational background. In 1763 he was a student at the Boston Latin School. Formed in 1635, it was the oldest school in America and the educational home of several men involved in the struggle for American independence. There is no known record of Craigie's serving an apprenticeship as an apothecary although his career evidences that he had an excellent grounding in pharmacy and the sciences.[4] Craigie was known and trusted by leaders in the Boston community in 1775 to be entrusted as a military apothecary appointed by name, even though he was only 21 years of age, having been born February 22, 1754.[5]

Medical care in the last quarter of the 18th Century still held to the Galenic theory that health resulted from balancing the four humors of blood, phlegm, yellow bile and black bile. Common therapies of the era (e.g., bloodletting, purging, puking, sweating) were applied to help restore a normal balance. Capital drugs, the most important ones of colonial medicine; included purgatives or cathartics such as rhubarb and jalap, emetics such as ipecac and tartar emetic, blistering agents such as cantharides (Spanish fly), opium for pain, and Peruvian or Jesuits' bark (cinchona) for fevers. Mercury in various forms was essential for the treatment of sexually transmitted infections. A common denominator of these and many other important medicines of the colonial era was that they had to be imported from or through Great Britain.

The practices of pharmacy and medicine were highly intertwined in colonial America. Four different figures were involved in the "procurement, preservation, preparation, compounding and dispensing of medicine": the physician, the apothecary, the druggist, and the merchant. The same individuals frequently played more than one of these roles.[6] Apothecaries of this era usually prepared by serving an apprenticeship. Most physicians maintained a doctor's shop where their apprentices were responsible for compounding medicines from botanical or other source materials. The druggist functioned as a wholesaler to apothecaries and physicians, procuring medicines from abroad as well as domestically. The merchant stocked popular British patent medicines, crude drugs, and other general merchandise.[7] The latter two roles required no training or experience in compounding the medicines of the period.

The contents of medicine chests for the Massachusetts militia in the field were selected by a special committee of the Massachusetts Provincial Congress in early 1775.[8] Medicine chests contained botanical and chemical products, surgical dressings and instruments, as well as equipment and supplies needed to compound prescriptions. Included items ranged from the dozen or so capital articles mentioned above to the less essential, such as powdered crab's eyes. Congress intended every militia regiment to have a complete medicine chest. However, this seldom happened in the early years of the Revolution when medicines were frequently in short supply.[9] Instead, these chests contained what materials were available, with the assumption that missing components would later be supplied from the general hospitals staffed and supplied by the Continental Army. Expected contents shifted considerably between 1776 and 1778 as evidenced by a comparison of chest inventories across that interval.[10]

From the beginning of the American Revolution, the availability of drugs, both in quantity and location, was a complex and recurring problem. The British Parliament ordered the Port of Boston closed to importation after the imposition of the Port Act in March 1774. As a result, once hostilities started the Massachusetts militia was largely dependent on what supplies were already present in the colonies. Stocks in individual apothecaries and doctors'

Fig 2. A medicine chest of the Revolutionary period

shops were the main source of medicines. Units of the Massachusetts militia, and subsequently the Continental Army, were provided with 15 medicine chests from the Greenleaf Apothecary Shop in Boston and distributed to Concord and six other towns.[11] Boston also depended heavily on other cities, especially Philadelphia, which had an ample supply of drugs and well-supplied apothecary shops. Ships from the British West Indies were also still landing supplies in Philadelphia. The Marshall brothers of Philadelphia alone supplied at least 20 medicine chests to militia battalions from Pennsylvania, New Jersey, Virginia, Maryland, and Delaware.

The Second Continental Congress authorized the formation of the Continental Army on June 14, 1775, from the troops already gathered to impose the siege of Boston. The battle for Bunker Hill, really Breed's Hill, took place on June 17 with Craigie attending to the wounded. On June 19, the Continental Congress appointed George Washington Commander in Chief; he took command in Cambridge on July 3. He quickly communicated the need for a hospital service. On July 27, Congress authorized the establishment of a general hospital, meaning a health care system not just a physical site, that included a chief physician, an apothecary, surgeons and mates and enumerated the duties of medical personnel to care for a 20,000-man army: "Surgeons, Apothecaries, and Mates to visit and attend the sick, and Mates to obey the orders of the Physician, Surgeons, and Apothecary." The apothecary was to be appointed by Director General and Chief Physician Benjamin Church.[12]

The British army was taken as the model to develop the first American military medical service. The general hospital was both better staffed and equipped than the smaller regimental hospitals. Regimental hospitals had to turn to the general hospital to replenish their medicine chests.[13] While Church, and later John Morgan, fought to increase the use of the general hospitals (in contrast to the regimental hospitals) many wounded or ailing soldiers preferred staying with their friends and under the care of the surgeons who were part of their own regiment.[14]

In the meantime, Craigie's name appears in the records of the Third Massachusetts Provincial Congress on July 4, 1775, when he was appointed "commissary and apothecary to the army raised by this congress."[15] Accordingly, on August 3, apothecary Craigie and assistant apothecary James Miller Church (the son of Benjamin Church) were directed to "put up and distribute said medicines" at Watertown.[16] Meanwhile, John Brown Cutting, who would later become the Apothecary General for the Eastern District, served as an assistant apothecary with militia forces in Newark.[17]

When British troops withdrew from Boston in 1775, they abandoned a significant supply of medicines. The British had contaminated some of the drugs with arsenic, but a considerable amount was judged to be safe. Additional supplies were commandeered by the Continental Army from the shops of loyalist physicians and apothecaries. One of the physicians, Dr. Sylvester Gardiner, reputedly had the largest drug businesses in Boston and his confiscated stock filled 20 or 25 wagons.[18] By the end of June 1776, Morgan had gathered enough medicines to provide chests to five regiments in Massachusetts and 30 in New York.[19]

John Morgan was appointed as the second Director General of the Medical Department of the Continental Army in October 1775 after Benjamin Church was accused of treason and removed. Morgan had training in pharmacy, having served as the second apothecary of the Pennsylvania Hospital before receiving his medical education in Edinburgh and other European centers. Upon his return from Europe, he founded the first medical school in the colonies at the College of Philadelphia. Morgan took a strong public position that the skills of the apothecary, physician, and surgeon were different; that they were important and distinct professions. The physician should prescribe and the apothecary compound.[20] In July 1776 Morgan appointed Craigie as apothecary in the Continental Army. Morgan emphasized the value of Craigie in a letter to Dr. Jonathan Potts, Deputy Director General of the Medical Department of the North: "without such a one I know not how you could either procure sufficient medicines for your department or dispense them when got."[2.]

The procurement of medical supplies was a problem with various departments vying for the same limited supplies. The regimental hospitals consistently requisitioned supplies from their sponsoring colonies, thereby diverting supplies intended for the general hospitals. Individual medical directors tried to directly obtain medicines to fulfill their needs; the hospital in the Northern Department was competing with other military hospitals for medical supplies. Congress also was active in the procurement of medicines, including those for the embryonic Navy. In addition, civilian physicians competed for medications. The continued lack of coordination and the competition for scarce medicines drove up prices. Frequently, this approach resulted in medicines not being available in the place of greatest need. To address the situation Congress named William Smith in July 1776 as the continental druggist with the charge to receive and deliver all medicines for the colonial troops.[2.] Smith had owned an apothecary shop in Philadelphia; he had served as a Philadelphia delegate to the Pennsylvania Provincial Conference in 1774.[23]

On November 1, 1775, Massachusetts passed *An Act for Encouraging the Fixing Out of Armed Vessels, to Defend the Sea Coast of America, and for Erecting a Court to Try*

and Condemn all Vessels, that Shall be Found Investing the Same, which authorized the establishment of privateering. By the end of the war, privateers from Massachusetts alone captured over 1,000 British ships.[24] Rhode Island and New Hampshire soon followed in authorizing their own privateers and shortly thereafter the Continental Congress also passed a privateering law allowing more privateers and navy vessels to attack commercial shipping.[2,] In testimony to the British House of Lords in 1778, a report noted the loss to privateers of 733 ships worth over ten million dollars.[26] Other estimates state the British losses were between 1,600 and 1,800 ships or more due to privateering. The impact was a considerable financial cost and, perhaps more important, the considerable diversion of war materials from the British to the revolutionaries, especially medicines.[27] Privateering became a major source of Jesuits' bark; one prize contained four tons of Jesuits' bark along with other items.[28]

The reorganization of the Medical Department in 1777 established four districts. The Northern Department covered the Lake Champlain area, the Eastern Department covered the area east of the Hudson River, the Middle Department stretched from the Hudson River to the Potomac River, and the Southern Department from the Potomac River to Georgia. The reorganization also established the position of an apothecary general for each district, with as many mates as deemed necessary, "whose business it shall be to receive, prepare, and deliver medicines and other articles."[29] Andrew Craigie was appointed apothecary general of the Continental Army, Israel or Josiah Root for the Northern Department, John Brown Cutting for the Middle Department, Henry C. Flagg for the Southern Department. Dr. A. Giles may have been the Apothecary General of the Eastern Department.[30]

The duties of the hospital apothecary were stated explicitly in documents from the Southern District in 1777: "the Apothecary and Mate to make up the Medicines, and to attend the hospital at 7 o'clock in the morning to inquire if the Patients have taken the prescriptions and obeyed the orders given them, and to report the same to the Director accordingly. He is to likewise make regular entries of the Medicines prescribed, and to keep exact accounts of the Stock on hand as his Books [?] [sic] are to be examined frequently by the Director."[31]

To standardize and simplify preparation and distribution of medicines in military hospitals, the first American pharmacopoeia was published in 1778. It is generally accepted that Dr. William Brown, stationed at the hospital in Lititz, PA, serving as the Physician General of the Middle Department, was the author.[3,] It is likely that Brown had earlier experience handling drugs in his medical practice in Alexandria, VA. The 32-page publication became known as the *Lititz Pharmacopoeia*. Written entirely in Latin, it was titled (translated) as the *Formulary of simple and yet efficacious remedies for use of the military hospital, belonging to the army of the Federated States of America. Especially adapted to our present poverty and straitened*

Table 1. Dose forms of the Revolutionary War

Apozema	Concentrated decoction or infusion of botanical drug.
Cataplasm	A watery poultice intended to be warmed and applied to a body surface
Decoction	A mixture in which herbs, seeds, roots, or bark have been boiled
Electuary	Dried, pulverized herbs mixed with honey
Elixir	Sweetened preparation of alcohol and small amounts of drugs, usually botanical substances
Epithem	Moist, soft poultices containing blistering or astringent materials
Fomentation	A poultice of herbs absorbed in woolen cloths and applied hot
Gargalism	A medicated throat remedy usually with astringent or antiseptic properties
Infusion	An aqueous preparation made by extracting a drug from a plant with hot water
Injection	A drug inserted into a body orifice (but, in this era, never a vein)
Litharge	White lead used in the preparation of ointments and plasters
Ointment	Herbal ingredients mixed with grease
Pills	A mixture of herbs with a binder (honey), rolled to produce small dosage forms
Plaster	A mass spread on a backing material for prolonged application to the skin
Poultice	A soft moist mass, such as a jelly, made from boiled herbs and applied hot
Pulvis	Substance, such as an herb or sugar, finely ground into a powder
Tincture	Alcohol solution usually containing a finely ground powder
Unguent	A plaster diluted with oil
Waters	Preparations made by dissolving a volatile substance in water

circumstances, caused by the ferocious inhumanity of the enemy, and the cruel war unexpectedly brought upon our fatherland. While there is no direct evidence that Craigie, or any apothecary, was involved in its creation, Craigie and Brown were friends; Lititz and Craigie's base in Carlisle were geographically close.[33]

The *Lititz Pharmacopoeia* was a unique work for the trained physician and apothecary.[34] A number of the formulas (i.e., compounding instructions) were based on the 1756 *Pharmacopoeia Edinburgenis* with some formulas contained in the 1746 *Pharmacopoeia Londinensis.*[35] The first part of the *Lititz Pharmacopoeia*, titled *Medicamenta Interna*, contained 84 formulas with 23 different dosage forms for internal use. The second part, *Medicamenta Externa feu Chirurgica*, included 16 formulas for external use. The dosage forms included pills, electuaries, tinctures, fomentations, epithems, and mucilages (defined in Table 1). The Latin publication with the frequent direction of *secundum artem* ("mix according to the art") indicated that only a trained apothecary or physician would be able to use it to prepare medicines; it was well beyond the capabilities of the average regimental surgeon.[36] There were also a number of formulas, such as paregoric (formula 23), tincture of Peruvian bark (formula 81), and laudanum (formula 82) marked with an asterisk that were intended to be prepared in the general laboratory and not in the hospitals.

Craigie established a centralized laboratory and depot for medical stores in Carlisle, PA, where the majority of hospital drugs were compounded and distributed.[37] On May 1, 1778, he wrote to Dr. Potts, then serving as the Purveyor-General, advocating the establishment of a principal store in Carlisle, PA "where all medicines shall be prepared and the chests completed ⋯ that an apothecary attend each medicine chest and that the surgeon and physician general of the army be attended by an apothecary with a good chest." [38] No record has been found of which medicines were produced by Craigie in Carlisle. However, it is likely that the compounds mentioned in the *Lititz Pharmacopoeia*, such as castor oil and red precipitate of mercury, were among the items prepared.[39]

In 1778 the decision was made to recall all of the large hospital medicine chests and replace them with smaller units that would be easier to transport, and thus more appropriate for the needs of the regiments in the field. The work was initiated by Apothecary General Cutting at Yellow Springs, PA. Many of the contents were packaged in units measured in drams (1/8 of an ounce) such as paregoric (2 drams) and tartar emetic (one-half dram).[40]

The armies continued to suffer from supply problems especially during the winter of 1777-1778 in Valley Forge. Some of these were undoubtedly due to the shortages of materials in the colonies. However, competing interests of the various departments and poor management led to increasing costs and hoarding of medical materials. In yet another attempt to address these issues, the deputy director general in 1778 was charged with the responsibility to oversee the provision of "medicines, instruments, dressings, herbs and necessaries."[41] Dr Jonathan Potts was tasked to buy and distribute supplies, including medicines, to the hospitals. In 1780 the geographical departments were eliminated in a departmental reorganization. Andrew Craigie was named Chief Apothecary of the Army, and the duties of the hospital apothecary were spelled out "to prepare and deliver medicines, instruments, dressings, and other articles." The purveyor and apothecary were to provide medicines for the use of regimental surgeons before the patients were moved to a general hospital. Thomas Bond was formally named to the post of purveyor.[42]

Early in the conflict men in the hospital department had neither the rank nor privileges of a commissioned officer; titles of medical personnel described the authority and job function. The relative rank and pay within the medical department were established by the law of April 7-8, 1777. However, the title did not imply a commissioned military rank or privileges, such as uniforms.[43] On October 27, 1779, medical officers were allocated a clothing allowance "The Deputy Director General, the Physician and Surgeon Generals and the Apothecary General were authorized to draw at the same as a Lieutenant Colonel."[44] In 1780 Congress extended to medical officers the benefits of land grants and half pay at retirement that had been granted earlier to line officers. Physicians, surgeons, and apothecaries were assigned grants the same as a lieutenant colonel while regimental surgeons and assistants to the purveyor and the apothecary, the same as a major while mates received the benefits equivalent to that of a captain.[45] Craigie, however, may have received the privileges of a colonel since he received a higher salary than hospital physicians and surgeons.[46]

In July 1780 a second formulary developed in America was printed. The *Compendium Pharmaceuticum provided for the French Military Hospitals in the Northern New World*, was written by the French army chief physician Jean-Francois Coste. The *Compendium*, written in Latin, was only 16 pages with 88 formulas, most of which were simple preparations of potions and decoctions. Unlike the practice in the colonial armies, the French publication did not contain any Jesuits' bark preparations. No evidence was found that Coste's work was utilized by American physicians and apothecaries nor did the French utilize the Lititz publication.[47]

While individual physicians undoubtedly gained skills during the war, few significant insights into the prevention, diagnosis, or treatment of disease resulted.[48] Perhaps the major advance in preventive medicine during the

Revolutionary War was George Washington's decision in January 1777 to order the variolation of troops who had not survived smallpox infection earlier in life.[49] While there is no direct evidence that apothecaries were involved in distributing smallpox matter to enable variolation, variolation preparatory regimens often included purgatives or the use of devices that were contained in the medicine chests of this era.

For pharmacy, the American Revolutionary War was a time of firsts. Legislation in April 1777 spelled out the responsibilities of the apothecary general and the apothecaries to receive, prepare, and deliver medicines to the hospitals and the army.[5.] Thus the supply chain for medicines from procurement through bulk manufacturing and compounding and distribution to the general and regimental hospitals, including the administration to patients was the role of the Revolutionary War apothecary. Recognition of pharmacy by the national government with a stated definition and role; the appointment of an apothecary general at several echelons; the first American pharmacopoeia; and the beginnings of American pharmaceutical manufacturing all accelerated the separation of pharmacy and medicine, serving to recognize that pharmacy was a unique health care profession.

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A Tale of Two Tomes: Providence, Provenance and Medical Education at the Dawn of the American Revolution

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Objects connect us to history, whispering of what they have witnessed. A building, an artifact, or even a tree connects us to the past in a tangible and physical way. For me, old books work this magic, particularly rare and important medical books relating to military medicine. These books provide a sense of continuity with the people who held, read, wrote, and discussed them. The original owners of my books often wrote their names inside the covers or made marginal notes and comments. These names and marginalia frequently lead to discoveries as interesting as the contents and occasionally even more so.

Medical books occupied a much more important place in the lives of our forebears than they do in our own. In the 18th Century medical books did not compete with journals, apps, or podcasts. Apart from word of mouth, books were the only avenue through which medical knowledge could be accessed and disseminated. Two books in my library inspired this essay. One was once owned by Dr. William Dexter and the other by Dr. Samuel Whitwell, Jr., both physicians of revolutionary Boston. Their educations and backgrounds exemplify two of the routes to medical practice in pre-Revolutionary America. Doctors Dexter and Whitwell knew one another during their lifetimes, but neither was famous, and both have long since receded into the mists of time.

On December 4th, 1785, Dr. Edward Flint, a 53-year-old physician of Shrewsbury, Massachusetts, left the deathbed of his former apprentice, 31-year-old William Dexter. (In a cruel irony, Flint had also attended the death of William Dexter's father, Dr. Ebenezer Dexter, 12 years earlier.) William Dexter left a wife, three children, and an insolvent estate. His debts occupy 16 pages of his probate record, while his credits are confined to only three. Fortunately for his family, Massachusetts law shielded the widow's home and necessary furnishings from creditors. The remainder of his possessions, including his medical books, were consigned to the auctioneer.[1]

Two months later, on February 6th, 1786, Dr. Daniel Brigham, a 26 year, old, colleague, and neighbor of Dexter's, who, like him, had served as a surgeon's mate in the Revolution, attended the auction of Dexter's effects.[2] Medical saddle bags, a good horse, a medicine chest and Dexter's pocket instruments were all sold at the auction. Brigham purchased Dexter's books, one of which is on the desk before me. After the auction Daniel Brigham opened the book to the page bearing William Dexter's signature, and, in a legible hand wrote: "Doct[r] Daniel Brigham's Book. Bo[ugh]t at Vendue [auction of] William Dexter, Deceased. 1786..

The travels of Dexter's copy of Samuel Sharp's *Treatise on Operative Surgery* after William Brigham's death in 1837 may never be known. Sharp (1709-1778) was the senior surgeon to Guy's Hospital in London and frequently mentored visiting students from overseas. One of Sharp's American students, Dr. John Jones, (1729-1791), returned from England to become a prominent medical educator. In 1775, when war became imminent, Jones authored *Plain, Concise, Practical Remarks on the Treatment of Wounds and Fractures*, the first medical book to be written and published in America. Specifically addressed to American surgeons of the Continental Army, Jones' book recommended Sharp's *Treatise* to his colleagues as they prepared for war.[3] Popular for nearly one hundred years, Sharp's work was translated into five languages and went through eleven editions.[4]

Samuel Sharp was known as a surgeon rather than a physician. The two fields were entirely distinct in 18th Century England, unlike the American colonies. The physician, whose practice was based on an intensive study of texts and theory, was an academic. A surgeon, who worked with his hands and valued practice over theory, was a craftsman. Jones maintained, "[Surgery] has nothing pleasing or attractive in it, but is rather disgusting to nice, timid, and

Fig 1. William Dexter's copy of Sharp's Treatise

delicate persons. ... A physician [possesses] an exclusive knowledge of science, and consequently the right of directing ... a surgeon operator, to whom the mere manual part [is] committed."[3] The legacy of the separation of medicine from surgery is still evident in present-day Britain where surgeons carry the title "Mister" and only physicians are called "Doctor." In Britain, "mister" is today a professional designation of greater prestige than "doctor."[5]

Already by the time of the Revolution, however, the status of surgery as inferior to medicine was beginning to change. However, as Jones maintained in his magnum opus, it was impractical for American doctors to divorce surgery from "physic," the prevailing 18th Century term for the practice of medicine. There were too few healers in the colonies to permit this luxury. The same man would be called upon to draw a tooth, set a fracture, deliver a breech baby, treat a fever, apply leeches, compound medicine, induce a sweat, remove a musket ball, and amputate a limb. Jones noted "In most European countries, an invidious distinction has prevailed, between physic and surgery, but in this part of the world, the two professions are generally united. Indeed both the branches of medicine, are, in the very nature of things, so intimately connected, as not to admit of absolute separation, without manifest injury to each."[6]

My copy of Sharp's book was published in London and bears the inscriptions of three prior owners. The first signature, a Latinized rendition of "John Shaw," is dated June 27th 1759, only one year after the book was printed, so Shaw, whose identity remains a mystery, was likely the first owner. At the top of the first blank page, William Dexter penned his name. Beneath these, we have Dr. Daniel Brigham's inscription.

Public records tell us something of the life of William Dexter, physician of Shrewsbury and Marlborough, Massachusetts. We know that he was born in Marlborough, 17 April 1755 and died there 4 December 1785. He was the eldest son of Ebenezer Dexter, a prominent Marlborough physician. Twenty percent of all colonial physicians came from medical families.William would have become the understudy of his father, but his father died suddenly aged thirty-nine. William was instead trained by his father's physician, Edward Flint, who practiced in the neighboring town of Shrewsbury.

At the time of the Revolution, a medical apprenticeship lasted 4-7 years and a doctor's apprentice could be as young as 15 years old, seldom younger. A very few aspiring doctors attended college before beginning a medical apprenticeship; they usually had an abbreviated two-year apprenticeship.An apprentice could either board separately or reside with his master. In addition to visiting patients with his master, he would also assist with menial tasks related to the physician's work. He would groom and attend his horses and carriage and contribute to the management of his practice. If he lived in the household, the apprentice would often contribute to all household chores. In return, ideally, he would have access to his master's library and could expect practical instruction in medical, surgical, dental, and obstetrical treatment. The best-educated preceptors would require prospective apprentices to have a working knowledge of Latin, mathematics and natural history, but a rural preceptor, such as Dr. Flint, might not be so particular. Any medical apprentice would have to be able to write and read English and understand enough Latin to write a prescription or read a pharmacopoeia - but deficiencies in a rural apprentice's translation of Virgil were forgivable. A "gentleman physician" would, as a rule, have had a refined formal education, but this was not expected of the average colonial practitioner.

Apprentices had to pay an annual fee, varying according to the prominence of the mentor, £30-100 per year or perhaps $3-10,000 today. A prominent preceptor would also have a busy practice and a large library. A lesser-known physician in a rural practice might be busy, but probably would not have a well-stocked library, and probably never ventured beyond American shores for training.

An apprentice who resided with and served the household of his master might not be required to remit a fee, particularly if the preceptor was a simple country practitioner rather than a doctor of high repute. There was no standardization to the instruction an apprentice would receive and there was likewise no quality control. An apprentice to a North Carolina physician complained that his preceptor had "no library, no apparatus, no provision for improvement in practical anatomy, nor any other efficient means of instruction in medicine." And another complained, "I might as well read by myself, as with Dr. Ferguson, for he never examines me on what I have read..."

Few apprentices read the basic medical literature and fewer still ever witnessed a dissection. Most preceptors had only basic instruments and a few books. Many regarded their apprentices as a source of cheap labor and additional income, though, in better practices, the preceptor took pride in his own knowledge and treated his apprentices as protégés. While medical licensure would not become common for decades in most colonies, the preceptor was expected to provide his pupil with a certificate of competence which, in some places, was mandatorily registered with a court of record.Dr. Benjamin Rush of Philadelphia, perhaps one of the best-known physicians of the colonial era, recalled his apprenticeship under one of Philadelphia's most respected teachers, Dr. John Redman:

> *"I was absent from my master's business but 11 days, and never spent more than 3 evenings out of his house. In addition to preparing and compounding medicines, visiting the sick, and performing many little services of a nurse to them, I took exclusive charge of his books and*

accounts. I read in the intervals of my business and at late and early hours, all the books on medicine that were put into my hand by my master or that I could borrow from other students of medicine in the city. ... I recorded everything I thought curious or valuable in my reading and in my master's practice."

The American apprenticeship system had been borrowed from Britain but was less regulated. In Britain, apprenticeship agreements were enforceable contracts. The training still varied greatly in terms of quality, but in Britain, apprenticeship contracts stipulated that the apprentice must be clothed, fed, given access to medical books, and receive instruction in medicine from the preceptor.

William Dexter probably began his apprenticeship with Edward Flint shortly after the death of his father and he likely resided in Flint's Shrewsbury household. Based on their lifelong friendship, we can assume that Flint was a good master. We know that Dexter completed his training within five years because in February 1775 he married his neighbor, Betsey Bowker. He would not have been able to establish his own household if still a bound apprentice. At about the same time he married, Dexter joined the Shrewsbury militia (likely as surgeon's mate to his former mentor Edward Flint), who had been serving as a surgeon in the Shrewsbury militia since the French and Indian War.

Shrewsbury, like many New England towns, was spurred to action by news of the fights at Lexington and Concord. Shrewsbury was also the hometown of Artemas Ward, Commanding General of all Massachusetts forces. A post rider reached Shrewsbury shortly after noon, summoned Ward, and alerted the militia.

Militia from twenty-seven towns, numbering over 4,000 men, arrived in time to engage the British column on April 19th, and thousands more arrived over the next few days. Shrewsbury sent 128 men (three companies) on the 30-mile march to Boston but they did not arrive until the next day.

There was no organized medical care immediately after the Battles of Lexington and Concord. Neither the Americans nor the British had anticipated a major engagement that day. The British took a single surgeon's mate with their force. Estimates vary, but the Concord fight cost the British forces about 70 killed and over 170 wounded, while American losses totaled 94, about half killed.Before sunset on 19 April, William Dexter and Edward Flint were probably on the outskirts of Boston, working with the local doctors attending wounded American and British casualties in private houses, churches, and taverns along the "Battle Road."

The topography of Boston has changed dramatically since the American Revolution. In 1775, Boston was situated on a peninsula connected to the mainland by a narrow strip of land called Boston Neck. After the British withdrew across this isthmus into the city, militia units from across the colony streamed into the area, blocking the Neck. Thus began the so-called Siege of Boston.

Management and logistics for the Army prior to Washington's arrival was the responsibility of the Massachusetts Provincial Congress and the Massachusetts Committee of Safety. Although ten percent of the 250 Massachusetts Provincial Congressmen were physicians, insufficient forethought had been given to medical support. Doctors provided this care, but they did so unsystematically, with minimal guidance or direction. Following the British system, each militia regiment had a regimental surgeon and a surgeon's mate. Although, at least initially, most surgeons brought (and soon exhausted) their own supplies, such medicine chests as could be had were distributed to several of the regimental surgeons, with the intent that they be shared.

After Boston Neck was closed off, conditions rapidly deteriorated inside Boston, and it was impossible for those inside the city to get fresh provisions. British shipping became the source of all supplies. In order to reduce the number of mouths he had to feed, the British commander, General Gage, allowed some of the citizenry to leave the cramped town, but suspected whigs of fighting age found it difficult to leave. Among those stuck inside the city was a fervently patriotic 20-year-old physician's apprentice named Samuel Whitwell, Jr. Whitwell was the former owner of another book in my library; a 1770 copy of a book entitled *An Essay on Diseases Incidental to Europeans in Hot Climates,* the first English book on tropical medicine. Whitwell's educational journey illustrates another path to medical practice in pre-Revolutionary America.

Samuel Whitwell, Jr., son of a prominent Boston merchant, was born on January 12, 1754, prepared for college at the Boston Latin School and matriculated at Princeton on April 3, 1771. Princeton was an unusual choice for a Bostonian, but it was his uncle's *alma mater.* The Whitwell's were well-known as Whigs. Whitwell Sr. was a member of Boston's Ancient and Honorable Artillery Company and was among three Bostonians selected to "take depositions respecting the conduct of the Soldiery" following the Boston Massacre in March 1770.Whitwell occupied a high enough position in the patriot pecking order that on 28 August 1774, just about a month before commencement, Whitwell Jr was visited at Princeton by John Adams who was enroute to the First Continental Congress.

Upon graduation, Whitwell returned to Boston to be trained in medicine. In 1774 only two universities, Columbia (then Kings College) in New York and the University of

Pennsylvania (then the College of Philadelphia Medical School) were offering medical degrees in 1774, and by the dawn of the Revolution they had produced no more than 50 graduates between them. A medical apprentice with a college degree was uncommon in America, but due to Boston's affluence and proximity to Harvard, nearly half of the forty-odd physicians at the Siege of Boston held college degrees, all but two from Harvard.There was no pre-medical track; these aspiring doctors received a standard classical education. Some may have had a modest exposure to astronomy, physics, or chemistry, but science was not deemed essential; Latin was considered much more important for an aspiring physician than chemistry. The two-year apprenticeship usual for college graduates meant that degreed apprentices entered medical practice at about the same age as those without degrees, their early twenties. Bona fide medical degrees were rare in the colonies, even in Boston. Most of the few foreign-trained American doctors "walked the wards" and attended the lectures of esteemed London and Edinburgh physicians, but few obtained medical degrees.Not one New England physician present at the Siege of Boston had a medical degree.

New York and Philadelphia, however, boasted a few M.D.-holding physicians. Jonathan Potts (1745-1781) of Berks County, Pennsylvania, and Benjamin Rush (1746-1813) of Philadelphia were two examples. Potts came from a wealthy family. He studied the classics with private tutors, apprenticed to a distinguished Philadelphia physician and then enrolled in lectures at the Philadelphia Hospital. In 1766 he traveled to Scotland with Rush to study medicine at Edinburgh University. Potts and Rush became roommates and friends. Rush completed his studies, but a family matter compelled Potts to return home before graduating. In 1767, intent on obtaining a medical degree, Potts enrolled at the newly established Medical School of the College of Philadelphia. The curriculum had been designed by John Morgan and William Shippen, both Edinburgh-trained American physicians who were destined to become legendary rivals. The school they founded was patterned on the Scottish model. A candidate for admission required a preceptor's certificate of proficiency, knowledge of pharmacy, and one year of attendance on hospital wards. Those without a college degree were required to prove facility in Latin, natural philosophy (physics), and mathematics three years after completion of the Bachelor of Medicine degree, one became eligible for a Doctor of Medicine degree. Applicants for that degree had to be at least 24 years of age and complete an acceptable thesis. In 1767, there were only two professors at the College of Philadelphia Medical School, Morgan and Shippen. They taught three courses: Physic (Medicine), Anatomy, and Surgery, and students bought tickets to the lectures. Within a few years the faculty had increased to six and the curriculum was expanded to include Theory and Practice of Physic (John Morgan); Anatomy, Surgery, and Midwifery (William Shippen, Jr.); Materia Medica and Botany (Adam Kuhn); Chemistry (Benjamin Rush); and Clinical Medicine (Thomas Bond). Potts was one of the first ten recipients of the Bachelor of Medicine degree in June 1768. In 1771, after completing a thesis on fevers, he was awarded the M.D. degree.Thus, the few American medical graduates at the dawn of the Revolution were well-grounded in contemporary medical literature and were able to practice medicine, obstetrics, surgery, and pharmacy to the highest standards of the era. There was obviously a vast gulf in skill and knowledge between the rural apprentice-trained country practitioner and a university-trained physician.

In the summer of 1774, Whitwell apprenticed to Dr. James Lloyd (1728-1810). This was an understandable choice for a highly-educated, well-to-do Bostonian. Lloyd, a native of Long Island in New York, received his bachelor's degree from Harvard in 1747 before traveling to Britain and Europe to study under the finest physicians on the continent. Lloyd was one of the most distinguished physicians in Boston, and positions under his tutelage were highly sought. Among his former students was prominent whig politician and physician Dr. Joseph Warren. Warren resided with Dr. Lloyd while he was an apprentice, and they developed a life-long friendship. Lloyd had several apprentices. So popular was Lloyd as a preceptor that his household was almost a miniature medical school with Lloyd as the sole professor. This was not an uncommon situation in the most highly regarded medical practices of Boston, New York, and Philadelphia.

In one significant respect, however, Lloyd was an odd choice as a preceptor for young Whitwell; Lloyd was an avowed Tory. But unlike some of his fellow loyalists, he refused to sever ties with neighbors or professional brethren who opposed the Crown. He was on friendly terms with most of Boston's physicians and had trained many of the best of them. His family had divided loyalties. His brother Joseph, who still lived on Long Island, was a Whig, as were some of his own children and many of his apprentices. In a letter to his brother, merely a week before the Battle of Bunker Hill, he wrote, "... as I look upon the present dispute between Great Britain and her colonies, I am determined, if possible to avoid taking an active part on either side, and as I have some considerable interest in this place, also many good friends, some of which would be much distressed at my leaving them at this time when they're about few of the town practitioners remaining; and I can't but think my person and family is safe here as in any spot upon the continent. For these reasons, I cannot think of moving, unless compelled by necessity. Surely, many and great evils must attend a civil war."Lloyd remained in Boston throughout the siege and continued to count both Whigs and Tories among his patients. He served as a medical advisor to both Generals Gage and Howe, but he did not actively participate in loyalist politics. At the same time, he actively treated and socialized with the British occupiers, nor did he hide his royalist sympathies. This arrangement must have been rather awkward for the

ardently Whiggish Whitwell and, after the first shots were fired, it was likely very difficult for him to continue his studies inside the city with Dr. Lloyd. But getting out of the city was difficult. Even when Gage liberalized the issuance of passes, those with known rebel sentiments found it difficult to leave. Samuel Adams' physician son was also trapped inside the city. After the first blood was spilled, he "tried every way to obtain a pass, but to no purpose..."Meanwhile, outside the city on Dorchester Heights, William Dexter toiled with his former mentor, caring for his sick compatriots.

Two days after the fighting at Concord, the Massachusetts Provincial Congress ordered a hospital established and that "good surgeons" be procured to treat the wounded. The senior physician engaged to execute this order was Dr. Isaac Foster, a 1758 Harvard graduate, a member of the Provincial Congress from Charlestown and a well-respected physician. Foster consolidated the British wounded in a requisitioned Tory mansion and he remained in place until the Battle of Bunker Hill.

Medical preparations prior to the Battle of Bunker Hill were not optimal, but they were not entirely ignored. Fortunately, numerous doctors served in the Provincial Congress. The most famous of these physician-politicians was Joseph Warren, followed by his esteemed colleague Dr. Benjamin Church. On May 8th, nearly three weeks after the Concord fight, the Provincial Congress named Church and four of his colleagues to an examining board to determine the suitability of physicians proposed for appointments as surgeons for the army. The wide variation in clinical competence necessitated a method to protect the soldiery from incompetent physicians, but the Board did not meet until after the battle. Dr. Church had been given nominal charge of medical operations after Concord, but he did not put any real system in place. As it happened, when the Battle of Bunker Hill was being planned, Church was not even in Boston. He had been sent to the Continental Congress in Philadelphia to report on the situation of the Provincial army surrounding Boston. This was a good thing. Church would soon be arrested as a traitor who had been in regular communication with Gen. Gage. Nonetheless, at the time of the battle, the general hospital was in operation at Cambridge and several regimental hospitals had been organized by surgeons of the various regiments.There was a cadre of physicians tending the army.

William Dexter was one of thirty-three doctors present at the Battle of Bunker Hill and he is one of only eight who also treated the wounded from Concord. A number of surgeons, Dexter among them, had positioned themselves to the rear of the fighting ready to receive the wounded.

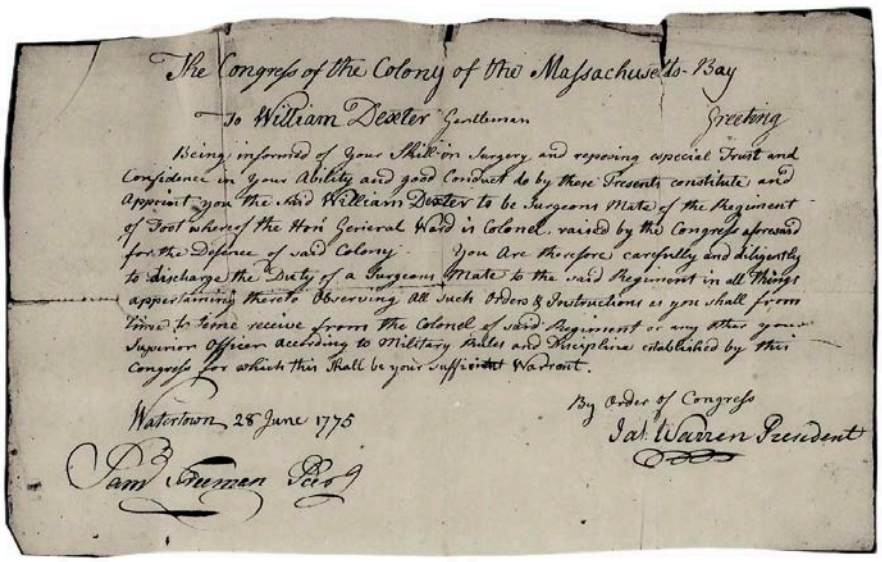
Despite limited preparation, the evacuation of the wounded Americans from the center of the battlefield was well-executed. Before the British overran the redoubt, the wounded were transported to the rear by carts, blankets, makeshift stretchers, or bodily assistance. The wounded were brought to the Sun Tavern, private dwellings, abandoned houses, and hastily organized dressing stations where their treatment continued. After the battle, Dexter doubtless assisted in the movement of casualties to Cambridge where he was engaged with treating the more seriously wounded, possibly at the General Hospital or at any one of the temporary hospitals between Charlestown and Cambridge. Care in the immediate aftermath of the battle would have been limited to stanching bleeding, dressing wounds, trephining head wounds, splinting fractures and amputations. Cambridge was overwhelmed with wounded soldiers after the Battle of Bunker Hill. Chaos reigned as over 300 badly wounded men were brought into the city. Some were sent to dressing stations that had been set up in private houses beyond the city limits and more were sent three miles to the rear to Watertown. The provincial congress directed the establishment of additional hospitals and ordered, "that the colonels of the several regiments in the Massachusetts army, be directed to recommend, immediately, suitable persons for surgeons and surgeons' mates."

Whitwell, trapped inside Boston likely attended the wounded British with his mentor and fellow apprentices since Dr. Lloyd was a senior civilian physician to the garrison. While under Dr. Lloyd's tutelage, both before and during the siege, the young Dr. Whitwell would have mastered the technique of variolation for smallpox and become familiar with the materia medica. He would have also assisted with setting fractures, reducing dislocations, bloodletting, drawing teeth, and the birthing of children. Until June of 1775 however, he would not however have had much exposure to trauma, a shortcoming he shared with most young American doctors. The British wounded of Bunker Hill were his first exposure to the wounds of war.

The situation in Boston in the aftermath of the Battle of Bunker Hill was untenable, so Lloyd must have given leave to those of his apprentices who so chose. He could hardly certify Whitwell's competence after so short a period of training, but doubtless many apprentices found themselves in similar situations. In July the British leadership, pressed by food shortages and the reemerging threat of smallpox, granted permission for a large number of citizens to leave the city and that month Whitwell presented himself to the Provincial Army in Cambridge for service.

Hospitals were established in Roxbury and Watertown employing large mansions that had been abandoned by their tory owners. Although the Americans copied the British system which prescribed one surgeon and one mate per regiment, there was no set formula for hospital assignments, so on June 24th, the Massachusetts Congress voted, "that there shall be two surgeons and tw. mates appointed for each hospital, and commissioned accordingly." Prospective Regimental Surgeons and Surgeon's Mates were usually

Fig 2. William Dexter's appointment as a surgeon's mate.



The Congress of the Colony of the Massachusetts-Bay

To William Dexter Gentleman Greeting

Being informed of your Skill in Surgery, and reposing especial Trust and Confidence in your Ability and good Conduct do by these Presents constitute and Appoint you the said William Dexter to be Surgeons Mate of the Regiment of Foot whereof the Hon'ble General Ward is Colonel, raised by the Congress aforesaid for the Defence of said Colony. You Are therefore carefully and diligently to discharge the Duty of a Surgeons Mate to the said Regiment in all Things appertaining thereto. Observing all such Orders & Instructions as you shall from Time to time receive from the Colonel of said Regiment or any other your Superior Officer according to Military Rules and Discipline established by this Congress for which this Shall be your Sufficient Warrant.

Watertown 28 June 1775

By Order of Congress

Jah Warren President

Sam Freeman Secry

appointed by regimental commanders before they had been subjected to examination. The appointment was not supposed to be confirmed until the candidate had passed an examination, but the examinations did not always happen. Granting both the mates and the surgeons the status of commissioned officers was a departure from the British system. In the British army, a surgeon's mate could be a warrant officer or occasionally even an enlisted man, but he did not have the status of an officer. While in both the British and the American medical departments, the distinction between a surgeon and a surgeon's mate was one of training and experience, in the American army, mates were simply unripe physicians, whereas in the British Army a mate was not expected ever to have the knowledge, experience or stature of a physician-surgeon. American surgeon's mates were often newly graduated or perhaps not-quite graduated apprentices, while full-fledged surgeons had both formal training and some experience. British surgeon's mates on the other hand, were an educational class below surgeons. While most British surgeon's mates did have some formal training, it was not a strict requirement. If a British soldier had some experience treating the sick or dressing wounds, he could be assigned as a surgeon's mate.

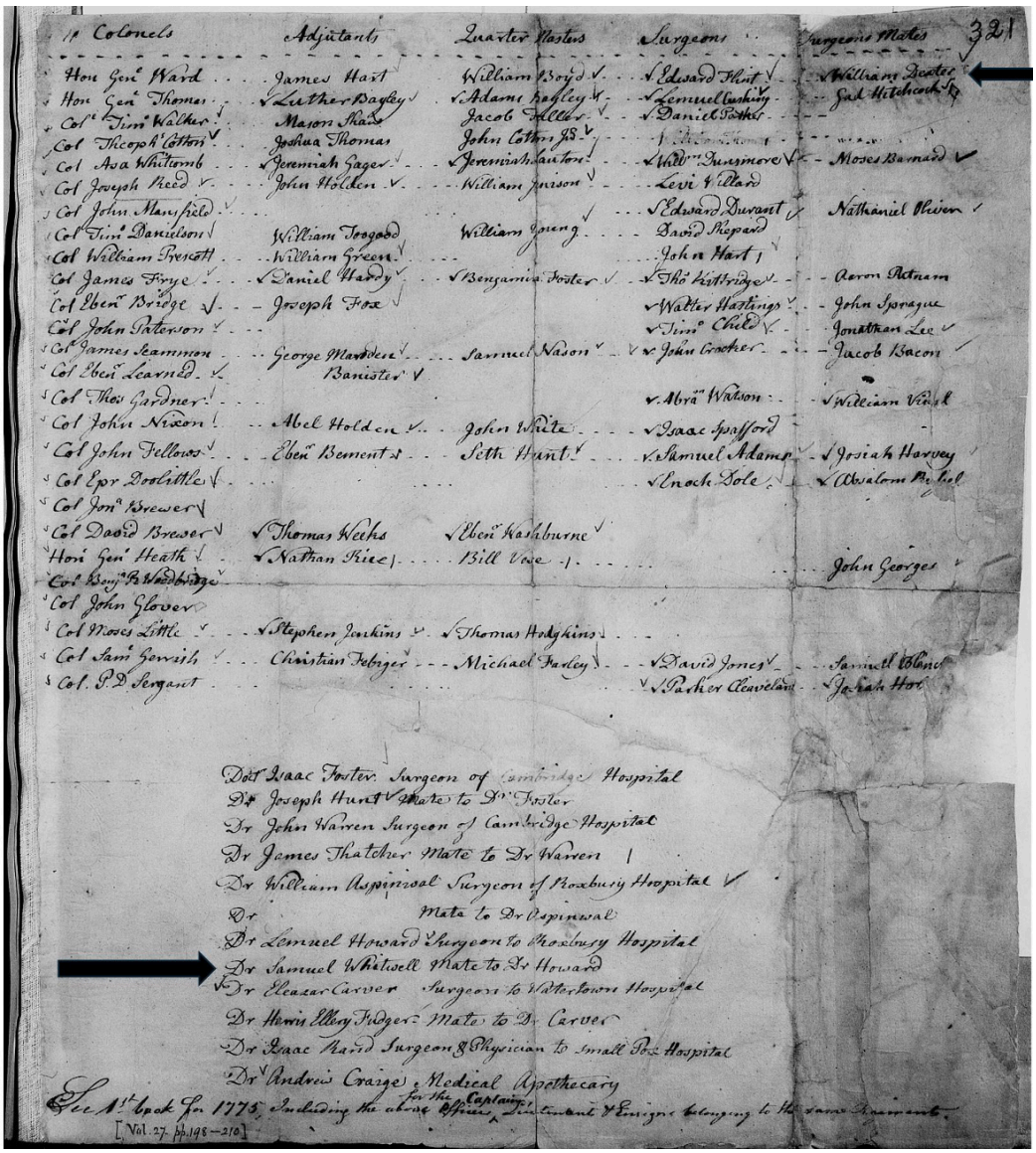
As in the case of Samuel Whitwell, sometimes the war curtailed an apprenticeship, and the student was left to finish his training as best he could. It is likely that some apprentices completed their training while serving as mate to their mentor. The colonel of a regiment would frequently choose a local physician who was known to him to serve as his regimental surgeon and this physician might select a recently graduated apprentice in whom he had confidence as his mate. It was expected, that with experience and demonstrated competence, most American surgeon's mates would eventually become full-fledged surgeons. Some mates in the British Army also became surgeons, but this was the rare exception rather than the rule.

On June 28th, 1775, eleven days after the Battle of Bunker Hill, William Dexter was officially appointed a Surgeons' Mate in Artemas Ward's regiment. He tended patients at the side of his mentor Edward Flint throughout the Siege of Boston at Cambridge and in regimental hospitals on Dorchester Heights

After the arrest of Benjamin Church for treason in October 1775, he was replaced as Director General of the Hospital Department by John Morgan of Philadelphia. Morgan did much to improve the Hospital Department but continued to be vexed by recurring disputes between the regimental and hospital surgeons. The chain of command of the regimental surgeons went through the regimental commander, whereas the hospital surgeons reported to Dr. Morgan. The regimental surgeons relied upon the general hospitals for supplies and were supposed to treat and retain only those patients they expected to be able to promptly return to duty. Those who were sicker, were, by regulation, supposed to be transferred to the general hospitals. Regimental surgeons, and many of their line commanders, did not like this arrangement and preferred to maintain control of their own sick and wounded in their own regimental hospitals to avoid exposing them to the crowded conditions of the general hospitals and also to keep them in proximity to their comrades. Regimental surgeons also resented their status as inferior to the hospital surgeons. They were paid less and were considered to be of a lower caliber. Frequently this was true but often enough it was not.

Because command of the regimental surgeons fell to the line, Washington became personally involved in disputes involving them early in the war. There was less scrutiny of the quality of regimental surgeons and mates. Though all were supposed to have passed examinations, this requirement was frequently overlooked and the regimental commanders who selected them were not necessarily good judges of clinical acumen. The quality therefore varied more widely among regimental surgeons than among the hospital surgeons. Most regimental surgeons were well-meaning, if not competent, though some were reprobates. Washington dismissed two regimental surgeons for making fraudulent drafts on the commissary and one for selling medical discharges. It was claimed that "with a few honorable exceptions they were the scum of the trade, inexpert, refractory, dishonest and vindictive." This judgement was certainly overly harsh, but it was to haunt the regimental surgeons from Boston to Yorktown. Washington had little patience with them, and he held a degree of prejudice against most regimental surgeons

Fig 3. Rare roster showing Provincial Army medical staff at the Siege of Boston. Top arrow points to the name of William Dexter as mate to Edward Flint and bottom arrow points to Dr. Samuel Whitwell as mate to Dr. Howard



throughout the war. In practice there was some fluidity to these positions, especially later in the war. Some hospital surgeons moved to regimental positions and some regimental surgeons became hospital surgeons, but tensions persisted through the war. Whitwell and several of his Boston colleagues began service as hospital surgeon's mates and ended the war as regimental surgeons.

The siege of Boston famously ended with the emplacement of the cannons Henry Knox transported from Fort Ticonderoga to Boston. The cannons threatened the British fleet and, not willing to risk another Bunker Hill to push the artillery back, the British evacuated Boston. They withdrew to Canada to regroup. Washington knew that once reinforced, the British would attempt to occupy New York so he moved his army there.

Whitwell, Dexter and most of the medical staff followed Washington's army to New York. Dexter remained a surgeon's mate to Colonel Jonathan Ward and returned to Shrewsbury after Washington's defeat in New York in the summer of 1776. Whitwell worked with Morgan in New York as a hospital surgeon before being assigned to Colonel John Greaton's Third Massachusetts Regiment in October 1776 as a surgeon's mate. After experience at the Battle of Brooklyn and White Plains in 1776, he was promoted to full-fledged surgeon. In September 1777, Greaton's regiment joined General Horatio Gates on the western bank of the Hudson near Saratoga Springs New York, at a place called Bemis Heights. Here Whitwell treated the wounded in two battles, collectively called the battle of Saratoga. Saratoga was a resounding American victory and resulted in the capture of General Burgoyne's army of 6,200 men. It was the turning point of the war which eventually resulted in the crucial American alliance with France. Benedict Arnold, the hero of Saratoga, was wounded in the leg during the battle and spent six weeks convalescing in the large military hospital in Albany, New York, where Whitwell was among his surgeons.

When the British surrendered on 17 October 1777, sixteen British surgeons were captured with their supplies. Samuel Whitwell was among the American surgeons who tended the British wounded and sorted through the supplies and goods abandoned by the enemy. Among the abandoned material, he found a book which had belonged to one of his British colleagues, *An Essay on diseases incidental to Europeans in hot climates.* The author, James Lind, was a prominent British naval physician who is credited with discovering that citrus, such as lime juice, prevents scurvy. Medical books

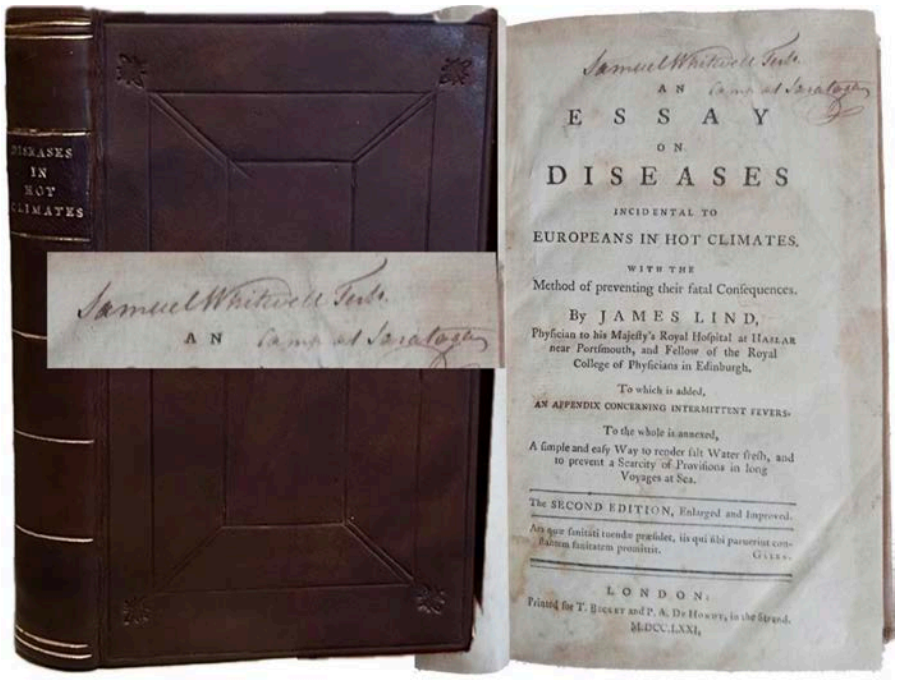
were highly prized during the revolution, and the British had no experience with the various fevers known to rage in the New World so any literature addressing this topic would have been sought by medical officers serving in America. Eventually he inscribed his name in the book along with the place he captured it, "Camp at Saratoga..

Whitwell was to spend the remainder of the war in defensive positions along the Hudson. He participated in a few skirmishes, but Saratoga was his last major campaign. In September 1782 he was at Washington's last review of the army at Verplanck, New York, and he was one of the founding members of the Society of the Cincinnati, showing he continued to identify with his military service. He returned home to Boston in November 1782, married in 1783, established a family, and died in his hometown of Newton on 21 November 1791 at the young age of 37, from unknown causes. Like William Dexter before him, he had not had time to accumulate much wealth in his brief eight years of post-war practice and he, like Dexter, died insolvent. An inventory of his property included ten medical books, a case of surgical instruments and sundry phials of medicine. None of his children pursued medical careers so presumably all of these items, including this book, went before the auction block.

It was serendipity that brought this book to me. It was listed among the wares of an Iowa bookseller, and the inscription "Camp at Saratoga" got my attention. I bought the book as fast as electrons could travel. The original endpapers might have told us more about prior owners, but they had vanished long ago. We do not know, therefore, through whose hands the book passed between 1791 and 1942, but during WWII it was bought by a young Army doctor who wrote his name inside the front cover: "William B. Bean, Major, Medical Corps, Armored Medical Research Lab, Ft. Knox, Ky, April 12 ,1944." Dr. William Bennett Bean was a prominent physician and writer of the last century, and had a sense of the history of the Army Medical Department of which he was a part.

As I approach two score years as physician and student of the history of medicine I fully appreciate the sentiment expressed by Bill Bean when he wrote "Books remind us of friendship. They lead us to equanimity and peace, at least peace of mind. They help us maintain our individuality without the austere and crushing loneliness of those who love only themselves. The wisdom we gain from books leads us to act as though we were building our ideas for eternity, mindful that the nature of life and death are so ordered that we and our works are fleeting and falling grains of sand in the hourglass of time. If we can avoid the apathy of those who claim to know that nothing matters and the sheer folly of those who know that they personally matter immensely, we shall have been worthy successors to that silent company of physicians, our medical forebears whose spirits watch over us here. Through the careful and scholarly .... use of books ... they built our great tradition. By following them, we must add to it as physicians wise and humble in the care, the comfort, and sometimes in cure of our fellows in their sickness and in their sorrow..

Fig 4. Lind's *Essay on Diseases Incidental to Europeans in Hot Climates* captured at Saratoga by Dr. Samuel Whitwell Jr. in October 1777



Today's medical databases bring us knowledge, but hardly connect us with previous generations, their thirst for medical knowledge, and their sacrifices for their country.

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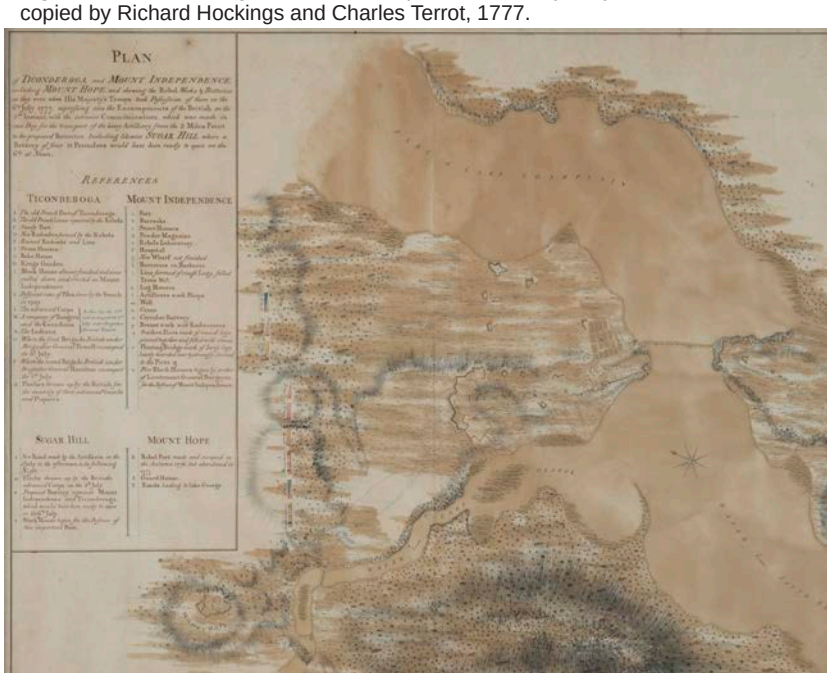
Ticonderoga: The Life and Death of an Army Hospital

Matthew Keagle, PhD.

Fig 1. Plan of Ticonderoga and Mount Independence surveyed by Charles Wintersmith, copied by Richard Hockings and Charles Terrot, 1777.



Fort Ticonderoga straddles the juncture of Lake Champlain and Lake George in far upstate New York (Fig. 1). Begun by the French army in 1755, it became the objective of successive British campaigns during the Seven Years' War (1756-63) until it was finally captured in 1759. From then to the beginning of the American Revolution, Ticonderoga remained a small British garrison, guarding the waterways that formed important lines of communication between the colony of New York and the new Province of Québec. This put the fort in the crosshairs once again when war broke out in 1775. For the next three years some of the most consequential campaigns of the Revolutionary War played out around Ticonderoga.

In this way Ticonderoga provides an interesting lens into the development of American medical systems during the War for Independence. Rather than being the site of a single battle, or even just a single winter's encampment, Ticonderoga represents a site of continual occupation unlike almost any other. Extending even before the Revolutionary War, Ticonderoga's experience reveals how Americans navigated the war's effect on medical care for soldiers. The first three years of the conflict found the American colonies, and later states, tackling different challenges each year in regard to recruitment, organization, provisions, and strategy. The scale of the occupation of Ticonderoga also varied from year to year and season to season during the period, as did its medical needs and capabilities. The solutions, the failings, and their effect on the army puts the broader issues facing the Continental medical service, and the challenges of the Continental Army itself, into greater relief. Ticonderoga's experience, while unique to its circumstances, is a microcosm of the issues more broadly facing the Continental forces in the first years of the Revolution.

Much has been written on medical practice in the Revolutionary period, and the 18th Century more broadly. The exact work of the physicians, surgeons, and their mates at places like Ticonderoga is also shrouded in a certain mystery. Accounts refer to the maladies diagnosed, and the stores and instruments needed, but much more rarely how they were employed, leaving historians to extrapolate treatments administered or operations performed. [1,2]

Of the dozens of medical officers that served in the Northern Department of the Continental Army, some have received extensive review. Doctor Jonathan Potts was a key figure here and has been the subject of a number of biographical treatments.[3,4,5] The Northern Department's medical services have also received several studies over the years. These previous histories, however, often begin in 1776, or later, when vastly more sources become available.[6,7] Studies of the physical infrastructure of medicine at Ticonderoga are almost non-existent. These are largely limited to the excavation and analysis of the General Hospital on Mount Independence. This was an important discovery, and one of only a few documented Revolutionary War hospital sites, but its construction and use date only to the last few months of Ticonderoga's wartime experience.[8]

Rather than add to those works the intention here is to better trace the arc of Anglo-American medical activity at Ticonderoga in the late 18th Century. For three years during the Revolutionary War, and nearly twenty years prior to that, soldiers occupied Fort Ticonderoga and the surrounding area. There they faced many of the medical issues that stalked all armies of the era, while also encountering situations and ailments unique to the region.

THE MALADIES OF PEACETIME

Despite its strategic significance, Ticonderoga had a reputation as an unhealthy post. Perhaps this was due to the juncture of waterways, the much cleaner water of Lake George tumbling into the larger Lake Champlain, with marshy and swampy areas near the lake shore. Even in the years immediately following the British capture of Fort Ticonderoga from the French in 1759 the garrison often lacked proper medical care.

The French had allocated a building near the fort as a hospital as early as 1757. In fact, it was simply one of the former wooden barracks, reassembled after they were replaced by masonry structures that year.[9] If the British inherited this intact following the French evacuation in 1759, it was not immediately reused for the purpose, or was deemed insufficient. Within weeks of the capture, acting engineer Lieutenant Dietrich Brehm of the 60th (Royal American) Regiment suggested using space inside the fort for a hospital.

General Jeffery Amherst, in overall command, had reservations about a dedicated structure for a hospital inside the fort itself, hoping instead to "find ground enough for [it] out of the Fort, whenever there may be occasion to Build one."[10,11] Distance could be helpful to stem the spread of infectious diseases, but otherwise a hospital building required no specific apparatus that would prevent existing structures from being used. For the sake of expediency Amherst relented, accepting a building that could occasionally be used for that purpose inside the old French fort.[10] Within a year Brehm made good on the general's initial suggestion and proposed "A Hospital to be made out the outside of the Fort" as part of a proposed rehabilitation campaign in 1760.[12] By that time the construction of the new fort at Crown Point, roughly a dozen miles north, and the preparations for the final campaign against Canada were underway, diverting resources and attention. Amherst informed Brehm that while a hospital, in addition to a smith's shop, brewhouse, and bakehouse were "all very requisite things, & I have no objection to them" they could "be deferred for the present."[13]

Medicines and hospital stores were in constant demand even if a dedicated facility was never explicitly created. Lieutenant Alexander Colquhoun of the New York Independent companies, who was also their surgeon, anticipated in July of 1761 that "as the Autumn approaches, the number of Sick may be augmented" and requested Amherst send "a mate to assist me; (being provided with Medicines for the Garrison only)."[14] Whether this was complied with or not, the need for medical supplies in addition to, or perhaps because of, the unhealthy conditions was an ongoing issue for the British at Ticonderoga.

Lacking a dedicated hospital facility, Captain John Ormsby commanding in 1762 reported to General Amherst that even "a surgeon & some Medicines are much wanted at this garrison."[15] Following Colqhoun's departure in the spring of 1762 the garrison had no surgeon. The garrison was so ill that "work is stopt for want of men." The maladies of the sick would become common during the fort's period of occupation, notably "agues and fevers."[16] Only by the fall was a surgeon once again reported in the fort. The surgeon was evidently an American, not part of the British regulars stationed there, and left with the rest of the Provincials in early 1763 as their enlistments expired. The ailments noted in the fall continued to affect the troops, with as few as ten men fit for duty at any time. Part of the ill health was due to the reliance on salted provisions and garden vegetables were seen as vital to restoring the health of the garrison.[17, 18]

Of course, such ailments did not spare the officers. In the late summer of 1761 Lieutenant Hugh Rose of a New York Independent Company stationed at Ticonderoga informed Amherst that "As Lieut-Calquhoun is very much Indisposed with the Fever & Ague" he was "not able to write" nor to act as a surgeon.[19] Two years later, again in late summer, Captain Ormsby reminded Amherst of the garrison's sickly state, noting that "nor are the Officers Exempt, scarce any body here has Escapd that Pernicious Disorder - I have had it these four days past most Severely."[20]

Conditions had largely not improved by the eve of the Revolution. In 1772 the 26th Regiment of Foot arrived at Ticonderoga. A detachment of the regiment would remain there until the beginning of hostilities, despite the expectation that they would be replaced in 1775.[21] By the early 1770s Ticonderoga was a subsidiary of the larger post at Crown Point, which meant there was no surgeon, much less a hospital. In fact, no hospital at all was established for the Northern District of the British Army's command in North America, largely the new province of Québec, the regiments taking care of their own sick.[22]

The 26th's surgeon, Hammond Beaumont, remained with the bulk of the unit in Canada. But his mate, Finley Miller, was eventually detached to Crown Point. There he noted the sickness of the soldiers. Not all of the health conditions were due to the location. Miller accused the commander of Crown Point, Captain William Anstruther, of not "paying any regard to a sick report or any Remonstrance of mine to the contrary." He claimed to have witnessed soldiers posted on guard "when shivering in a fit of an Ague" and others who had just recovered similarly being posted and remaining there "7, 8, 9 nay even 11 hours without being relieved, and then only from being taken sick on their Posts." Anstruther replied to Miller that it was his "duty to cure them; telling me at the same time that if I thought myself agrieved any ways I might complain to Above."[23]

Anstruther had the misfortune to be in command at Crown Point during a catastrophic fire in April of 1773, which gutted the fort. Combined with the accusations of Surgeon's Mate Miller, Anstruther was relieved of his command.[24] Anstruther was tried by a Court of Inquiry for the loss of Crown Point, as well as "employing his men in work of his own… to such a degree that sick men on the doctors report have been placed sentrys in order to get the men in health to the field, & those sentrys suffer'd to remain on their posts from seven to eleven hours notwithstanding the doctors repeated remonstrances."[25]

As a plaintiff to the Court of Inquiry, Surgeon's Mate Miller left and traveled to Montréal for the proceedings, but returned to Ticonderoga in 1774. By then most of the remaining garrison from Crown Point had been transferred to Ticonderoga by Anstruther's replacement, Captain William Delaplace, who had arrived in the fall of 1773. The movement of even 20 men to Ticonderoga dramatically increased the number of troops there, but it was still not a healthy post.

The erstwhile commander of Fort Ticonderoga itself, Lieutenant Jocelyn Feltham, had commented on the health of the garrison in response to Anstruther's plea for assistance following the Crown Point fire. He held Ticonderoga with only 15 men, who were far too few for basic duties even "allowing them all to be in health which is seldom the case in summer as this place is very much subject to fevers & agues." One of the men, acting as Feltham's servant had "not been off his bed these 10 months, as his disorder is of such a nature that his being sent farther northwards would be certain death I could not send him to the regt." In addition to environmental conditions that left men ill, or perhaps exacerbated them, many of the soldiers at Ticonderoga were "kept on the strength of the regt. through a principle of humanity in Col. Templer." That is to say, old soldiers were retained long enough to ensure them a Chelsea pension.[26]

In May of 1774 Surgeon's Mate Miller was reassigned to accompany two companies of the regiment to Trois Rivieres in Québec.[27] This left Ticonderoga with its garrison of largely "old wore out & unserviceable" men as the Revolution exploded into open war.[28]

1775: THE WOUND IS OPENED

The first year of the Revolutionary War rocketed Ticonderoga to the forefront of the popular consciousness when it was captured on May 10, 1775. The capture immediately widened the scope of the conflict and prompted serious reflection about the conduct of the growing war. Ticonderoga's location strained the limited capabilities of the American forces. This was no less true for the medical service. Ticonderoga's experience highlights the tensions between regimental and hospital surgeons, the lack of communication, and the overlapping responsibilities of colonial and congressional authorities that more broadly characterized the first year of the Revolution.

Most works about medicine in the Northern theater of the war focus on the broader campaign, rather than on single posts such as Ticonderoga. A narrower focus puts some of the bigger issues into greater relief and reveals how actors on the ground responded to the failings at higher levels. Such an emphasis also takes seriously a period from the opening of hostilities through the summer of 1775, when congressional resolutions on medical management were not yet implemented but medical care was still vital. This period illustrates the haphazard development of the American war machine at the beginning of the Revolution.

Even as the sickly British garrison of Ticonderoga endured the winter of 1774-75 events were in motion that would propel Ticonderoga to international prominence. Two separate colonial bodies, in Connecticut and Massachusetts, heard appeals for an expedition to take Fort Ticonderoga to secure valuable ordnance stores needed by the Revolutionaries. The two parties finally overtook each other near Castleton, in what is now Vermont, on May 8, 1775.[2.]

Benedict Arnold, a Connecticut man, had been appointed by the Massachusetts Committee of Safety earlier in the month had departed with just one other man. The larger group, authorized by a committee of the Connecticut Colonial Assembly, constituted the bulk of the expedition's manpower and funding. Military command fell to Ethan Allen in command of what might best be called a paramilitary group from Vermont, known as the Green Mountain Boys. These settlers held land titles in the region from the Colony of New Hampshire, which were contested by New York officials who claimed the same area as part of that colony. To oppose New York's claims, and their sheriffs and judges, the Green Mountain Boys used violence and the threat of violence against the Yorkers. As a loosely militarized and armed organization they provided the bulk of the troops with the addition of a number of Massachusetts men recruited along the way to Ticonderoga.

The expedition was large enough, reaching some 230 men, that some form of medical care was needed. In the days after the successful capture of Fort Ticonderoga Ethan Allen wrote a number of letters to Connecticut's governor Jonathan Trumbull. In one of these he acknowledges "that the Comitee of War for the Expadition Imploy'd Mr. Jonas Fay of Bennington to Proceede with the Scout to the said Premises in Character of Doctor & Chirurgeon."[30,31]

Jonas Fay went on to have a long association with Vermont statehood, one of the state's Founding Fathers, but in 1775 he was a self-trained physician residing in Bennington. The

limited evidence suggests Fay joined the expedition there sometime between May 2-7 as they recruited the bulk of the Green Mountain Boys for the enterprise. Although the capture of Ticonderoga was accomplished with no loss of life, there were some cuts and the presence of a physician with extensive experience was appreciated. Allen urged Governor Trumbull to retain Fay's medical skill "as there appears still a Greater Prospect of Need of a Person skilled in these sciences and as Doctor Fay Has with him on the Premises Considerable of a Quantity of Medicines &c. and is willing and well skilled to Continue the Campain in the said Capacity."[31]

What remained of Allen's and Arnold's commands had been formally replaced by Colonel Benjamin Hinman's Connecticut Regiment in mid-June. By that time Congressional officials had decided that Connecticut would oversee garrisoning Ticonderoga.[33] Facing the siege of Boston, Massachusetts accepted Connecticut's command at Ticonderoga, leading to Benedict Arnold's departure. With the gradual departure of Allen's Green Mountain Boys Dr. Fay was paid by the colony of Connecticut in his medical capacity through June 25, 1775, by which point Hinman's Connecticut Regiment had arrived. Once again Ticonderoga faced an inflection point for medical care as its first American surgeon departed.[34]

Hinman's command was still relatively small. His own regiment hovered between 400 and 500 men, some detached to various outposts. Only about 15 were sick by early July, presumably manageable for the medical services available. New Yorker Philip Schuyler was appointed to command of what was still known as the "New York Department" on June 19, 1775 and ordered to repair to Ticonderoga.[33(pp.99, 109)] At this point there was still not an overall medical service assigned for what would become the Northern Department of the Continental Army.[35, 36, 34]

A return of the troops in the theatre at the beginning of July indicated the presence of 1 surgeon and 2 surgeon's mates. Although listed with the staff these were the surgical compliment of Colonel Hinman's Regiment: surgeon Lemuel Wheeler, and mates Daniel Sheldon and Abel Catlin. By the end of that month Schuyler ordered that "The surgeon of Col. Hinmans Regiment is to take charge of the sick of other Regiments (which have no surgeon present)." The growing forces assembling for the invasion of Canada continued to increase the need for medical care and Schuyler lamented that "Hospital Stores and Surgeons are much wanted." A Doctor George Smyth was assigned to Fort George in early August. By this point at least one more regimental surgeon's mate was at Ticonderoga. Benjamin Ellis (or Elles) accompanied Captain Edward Mott's single company of Colonel Parsons' Connecticut regiment to the Northern Department that summer.[37, 34]

Ticonderoga's garrison was still relatively small at this time. It briefly peaked in August as at nearly 1,200 men (another 500 at Crown Point) as Continental forces were assembling for the Canadian invasion.[38] Despite Schuyler's reference to the "hospital" where surgeon's mate Ellis was working, there is little evidence this was a distinct physical structure yet. Just as Amherst had noted to British troops in the 1760s it is very likely that barracks could "in case of necessity… be converted into an Hospital."[10]

More regimental surgeons and mates arrived by late August as the Canadian invasion began. Perhaps as an acknowledgement of the number of troops now also at Crown Point about to embark, Schuyler ordered Samuel Whiting, first surgeon's mate of Colonel David Waterbury's Connecticut Regiment, there to stay with the sick. Within the day those orders were rescinded, and he was to remain with his unit. Waterbury's surgeon, Danbury doctor John Wood, was with his regiment, but his equipment was not. Schuyler had to write to subordinates to forward Wood's "Chest of Medicines & Instruments" which was still nearly 100 miles behind in Albany![37]

In addition to tending to the sick, another task of the surgeons was to assess men who were unfit for the rigors of the upcoming campaign. Schuyler instructed the garrison command at Ticonderoga to "give discharges to all such Men as have no prospect of being fit for service this Campaign, to whatever Regiment they belong, provided they have the Certificate of the Surgeon or his Mates."[37] Over 700 sick or worn out men were discharged by late September. The largest from any one regiment were from Colonel Hinman's, representing over half their strength from the beginning of July and perhaps a reminder of the persistent unhealthiness of Ticonderoga as much as the limitations of their medical care.[38]

Connecticut troops, and their surgeons, left in the fall when New Yorkers took over most duties at Fort Ticonderoga. Colonel James Holmes of the 4th New York Regiment acted as garrison command for the fall and winter of 1775. Under the command of the New Yorkers discipline tightened, paperwork became more precise, and attempts were made to improve the operations of the force at Ticonderoga. Orders in early October called for all the sick, and those feigning illness, to be paraded and inspected. From here "the Director of the Hospital… will then examine them and report which ought to be discharg'd, which to go to the Hospitall, and which to be put under the care of the Regimental Surgeons, & which to be sent to the Corps they belong to."[37] The truly sick men were removed to Fort George, over 30 miles south at the southern end of Lake George. Dr. Wheeler, the surgeon of Hinman's Regiment, would tend those unfit to move at Ticonderoga. He and the regimental surgeons were now to make daily reports of the men under their care

and what stores were needed to support them. This anticipated a congressional resolution to a similar effect later issued in 1776. [37, 1]

The use of "Director of the Hospital" in this context and at the date are important. In September of 1775 Doctor Samuel Stringer was appointed Director General and Chief Physician in the North. Stringer moved to Fort George at the southern end of Lake George where a general hospital was established. A flurry of orders from Schuyler prepared both the garrison's commander and the sick for his arrival.[371]

Soon after Stringer arrived at Fort George, Colonel Holmes at Ticonderoga delivered an interesting batch of patients. Holmes had informed the Ticonderoga garrison, which had just aided Henry Knox in his famous expedition, of a possible vector of infection. Without clarifying, he claimed he had it on "good authority" that all the women attached to the post were infected with venereal disease. To cleanse the camp, all women not married to a soldier were ordered to be rounded up and marched off to Fort George. It is unclear if medical treatment awaited them under Dr. Stringer's care, or if this was just a ploy to be rid of them, but the orders are a striking acknowledgement of the volume of women at Ticonderoga in late 1775.[39]

The transfer of the women to Fort George may have alleviated concerns at Ticonderoga, if the accusations of infection were legitimate, but the coming campaign put much greater stress on the developing medical services at the fortress complex.

1776: STAUNCHING THE BLEEDING

The failure of the American invasion of Canada in 1775 has long been tied to its poor health. The extensive movements of that army, its lack of provisions, medicines, virtually all other supplies, and the winter weather contributed to a very sick force.[36(p18)] Chief amongst the major ailments was smallpox. The disease ran rampant through this army of thousands of diverse Americans hastily brought together and the invasion occurred during the beginning of a continental epidemic of the disease.[40,1(p59)] General Philip Schuyler summed up the condition of the army to Washington "The most descriptive pen cannot describe the Condition of our Army—Sickness, Disorder, and Discord reign triumphant."[41]

When this army was finally driven out of Québec by fresh British troops in the first half of 1775, they retreated down Lake Champlain. Ironically, given the previously unhealthy reputation of Ticonderoga, it was deemed the best place to concentrate the army at a council of war on July 7. In addition to occupying the old barracks, storehouses, and fortifications at Ticonderoga a new post would be carved out of the forest on the opposite shore of Lake Champlain. As the army hewed, chopped, and dug in over July this promontory was renamed Mount Independence. There was, however, one major exception to this deployment. Most sick men, especially those with smallpox, would physically be separated from the core of the army at Ticonderoga.[42]

Medical care at Ticonderoga in 1776 suffered from faction and division within the service beyond the logistical challenges of getting provisions, stores, and medicines to such a remote location. In late 1775 Congress created the position of "director of the Hospital and chief Physician and surgeon for the Army in the northern department" which it assigned to Doctor Samuel Stringer.[1(p27)] Stringer's relationship, and subordination, to the Director General and Chief Physician which was established earlier was left somewhat unclear. Turnover in that position did not help matters. Stringer arrived to the Northern department in late June but by the end of July he had left, ostensibly to find medicines needed by the hospital. Stringer's absence lengthened and when he did return north he appears not to have returned to Ticonderoga, directing the department from Albany and Fort George.[1]

The lack of clarity over the authority of the medical service filtered down to surgeons and sick soldiers through a lack of supplies getting to where they were needed. In addition, the relationship between the congressionally established medical department and the front-line regimental surgeons and their mates was still unresolved. It was unclear what drugs regimental surgeons could draw from the general hospital despite those surgeons providing the bulk of medical care.[1(pp.31-32)] However, not all regiments maintained a full medical staff and some lacked such services entirely. For example, the 2nd Pennsylvania Battalion's regimental surgeon had been captured at the Battle of Trois Rivières in June.[43] To alleviate the need for care "One Woman from each Company of each of the Pennsylvania Battalions" was ordered "to the General Hospital… to nurse the sick."[44]

The general hospital was located at Fort George. Schuyler reported to Washington in mid-July that "Two Houses capable of containing about 350 are ready for their Reception and a sufficient Quantity of Boards is collected, under which to shelter the Remainder comfortably until Hospitals can be erected."[41] The transfer of sick personnel to Fort George has often been cited as a contributing factor in preventing the worst transmission of infectious disease and allowing the army to successfully withstand the British counterattack in the fall. What is less appreciated is that the plan was not entirely new. The ability to dedicate the hospital at Fort George to smallpox patients took advantage of the previous movement of medical personnel and equipment that had occurred with Doctor Stringer, the Hospital Director, and his staff in late 1775.

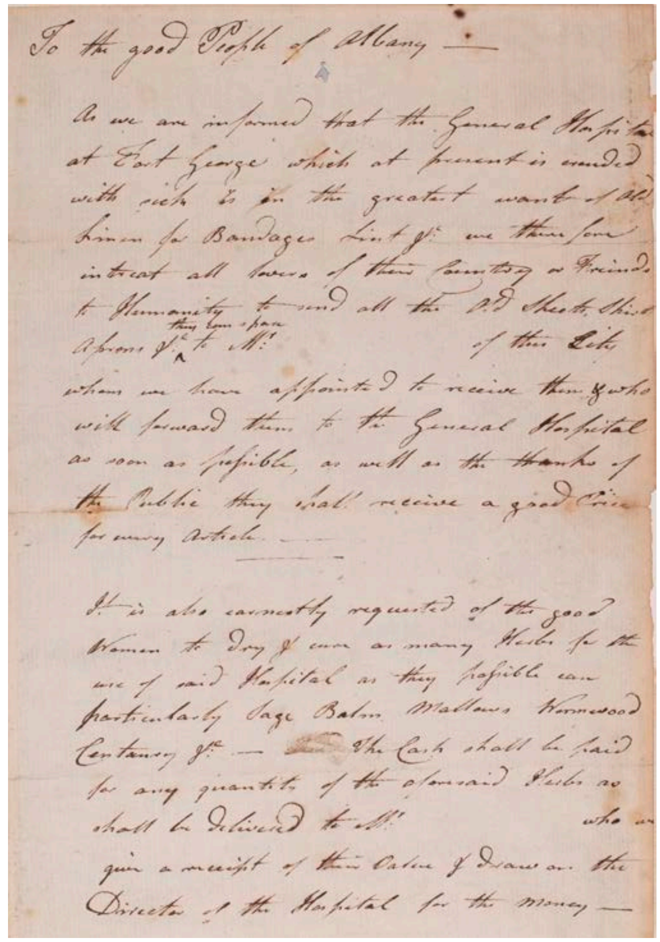
Doctor Jonathan Potts had been appointed as "Physician and Surgeon" in the Canadian Department and was sent north in June of 1776, but unlike his superior he remained in the theater for the duration of the campaign. Potts was perhaps the most diligent and competent physician in Ticonderoga's medical history. A Pennsylvanian, trained as a physician at Edinburgh and the University of Pennsylvania, Potts reflected the growing scope of the northern army, now drawn from a wide swath of the American northeast. Much has been written about Potts' short life but it bears noting that despite his efforts he too was affected by the lack of congressional clarity over the medical department and the rivalries within it.[5]

In Doctor Stringer's absence that summer Potts primarily labored at the hospital at Fort George, treating the contagious diseases that so wracked the army. The challenges he faced are apparent in documents now held by the Fort Ticonderoga Museum from the campaign. As early as mid-July he was appealing not to the absent Stringer, but Stringer's nominal superior, John Morgan, the new Director General of Hospitals for supplies. Morgan could not comply, practically because of a British blockade of the Hudson, and politically because the status of his authority versus Stringer's in the North was unclear.[45] Potts prepared a broadside to be posted in Albany desperately seeking linen for bandages and lint and encouraging "the good Women" of the city to find herbs which the army would pay for as it sought medicine for the troops (Fig. 2).[46] On October 4 Potts was summoned to Ticonderoga by General Horatio Gates as soon as Stringer returned to Fort George.[47]

Where did Potts and the other surgeons of the Northern Army work at Ticonderoga? A well-known plan for a regimental hospital appears in the Philip Schuyler papers. It consisted of a long timber framed building, 120 feet long by 24 feet wide. Two stories high, it contained two chimney stacks for a total of as many as eight fireplaces.[8] However, the location (or even existence) of any hospital structures in this form is unknown. John Trumbull, who served as Deputy Adjutant to General Horatio Gates, prepared the most accurate plan of the encampment and fortifications at Ticonderoga in 1776. That map does not identify any structures at Ticonderoga as a hospital. The Mount Independence side of the plan is much sparser and little is identified beyond the broad outlines of an "encampment."[48]

Some evidence comes from the general orders issued as the garrison prepared for an action with the approaching British in October. Regimental surgeons from the Pennsylvania and New Jersey Continentals and Massachusetts militia regiments stationed at Ticonderoga were ordered "to attend at the Old Fort with their Mates." This confirms the use, going back to the early 1760s, of barracks space within Fort Ticonderoga itself being allocated for temporary hospital use. An additional five regimental surgeons were ordered

Fig 2. "To the good People of Albany," Jonathan Potts, 1776.



To the good People of Albany —

As we are informed that the General Hospital at Fort George which at present is crowded with sick is in the greatest want of Old Linen for Bandages Lint &c we therefore intreat all lovers of their Country or Friends to Humanity to send all the old Sheets Shirts Aprons &c they can spare to Mr   of this City whom we have appointed to receive them & who will forward them to the General Hospital as soon as possible, as well as the thanks of the Public they shall receive a good Price for every Article —

It is also earnestly requested of the good Women to Dry & cure as many Herbs for the use of said Hospital as they possibly can particularly Sage Balm Mallows Wormwood Centaury &c — the Cash shall be paid for any quantity of the aforesaid Herbs as shall be delivered to Mr   who will give a receipt of their Value & draw on the Director of the Hospital for the money —

"to attend at the Place appointed near Col Waynes Markee with all their Instruments."[49] According to Trumbull's map this was in the refortified "French Lines" about a mile from the fort. Again these were a mix of Pennsylvania and New Jersey Continentals and Massachusetts militia, in addition to a surgeon of the artillery.

Across the lake on Mount Independence the remaining regimental surgeons of the Massachusetts and New Hampshire Continentals there were ordered to report to Potts, who had recently arrived. They were ordered to assemble "at the Gen^{l} Hospital on the Mount."[49] Since hospital could refer to a physical structure or administrative unit the order does not clarify its location. The following year, however, the posts' engineer Colonel Jeduthan Baldwin noted that General Arthur St. Clair "proposed to make a Laboratory of the old Hospital" on Mount Independence suggesting some kind of building.[50] That same year Surgeon James Thacher noted that "on the summit of the mount, which is table land, is erected a strong fort, in the centre of which is a convenient square of barracks, a part of which are occupied for our hospital."[51] Although this was written before the completion of the new General Hospital built in 1777, it is unclear if all these buildings were completed by October of 1776 (Fig. 3). In December of 1776 Colonel Joseph Wood had reported that

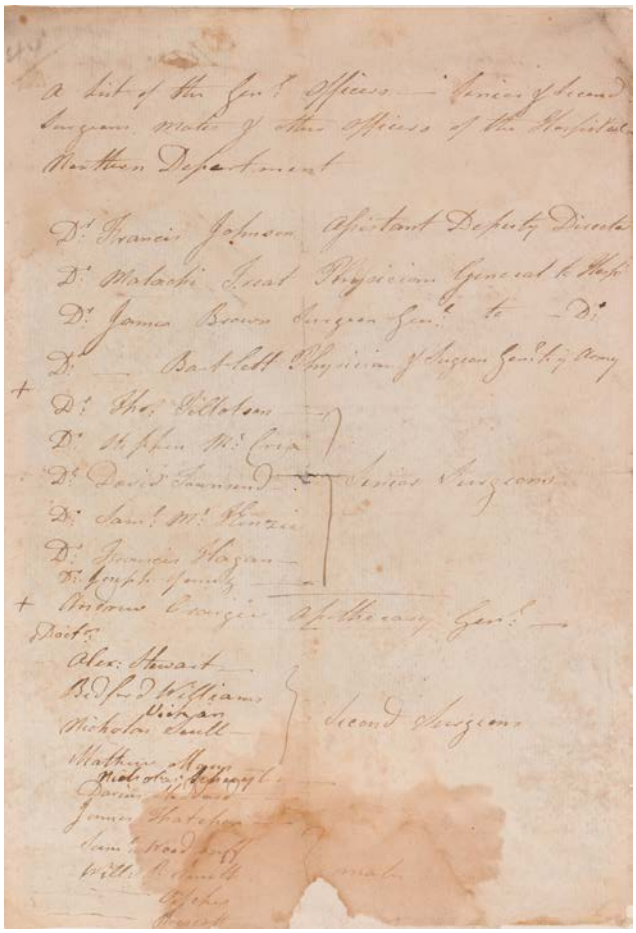
there were "no hospitals to go in." Tents, huts, or what other structures could be found likely substituted for the sick.[52] All evidence suggests that few if any purpose-built hospitals were provided for the Ticonderoga encampment in 1776.

By September records indicate that over half of slightly more than 11,000 men in the Northern Department were sick. The majority of those, roughly 3,500, were likely in regimental hospitals at Ticonderoga. This left 851 reported as sick and absent, presumably at the hospital at Fort George, although perhaps at other places including Albany.[53] That was down from over 1,000 in July following the retreat from Canada.[1] During the approach and subsequent retreat of the British in October fewer sick men remained with the army than the previous month. However the sick at Fort George continued to climb, even as a hundred sick Pennsylvanians left the general hospital for Ticonderoga "on hearing of the defeat of our Fleet." Colonel Anthony Wayne proudly proclaimed that the invalids "Immediately returned to this place Determined to Conquer or die."[54] The army had a lower percentage of sick overall, but beyond the recovery of some men this was in part due to reinforcements of militia who mustered fewer sick.[52]

This general improvement in the army's health may have been small consolation for the thousands of sick facing the winter. The remains of the garrison continued to suffer from a lack of provisions, lodging, clothing, and medicine. Colonel Joseph Wood, commanding one of the two remaining Pennsylvania Continental battalions wrote to Robert Morris in Philadelphia that "I paid a visit to the sick yesterday, in a small house, called a hospital" where he described a grisly sight of living and dead men crammed together. He continued, noting that "we have from Ten to fifteen every week that Bids fare well to this world."[55,52] The makeshift hospitals in barracks, huts, and tents were fumigated by burning pitch or tar "to evaporate the stangnated or putrid air" and vinegar was issued in an attempt to preserve the army's health.[49]To care for the wounded, regiments were ordered to send men "in proportion to the Number they have in the Hospital."[49] Nurses were needed as troops whose enlistments had expired or were redeployed to reinforce Washington's army were released, along with their women who were detached to the hospital.

On September 25, Congress appointed a committee to travel to the Northern Department. They were ordered to look into a variety of issues facing the army, including provisions, clothing, barracks, and enlistments and report back. The committee was also "empowered to make regulations for the hospitals in the northern department, and to remove or suspend any person employed therein, and to employ such as they may think necessary and proper." Such broad orders were unlikely to immediately rectify the confusing authority in the medical service, but at least could shine a light on the issues in the hopes of redress. The following day delegates Richard Stockton of New Jersey and George Clymer of Pennsylvania were selected for this duty.[56]

Fig 3."A List of the Genl Officers," Jonathan Potts, 1777. (Fort Ticonderoga Museum Collection, MS.1994) An undated return of medical personal in the Jonathan Potts Papers at Fort Ticonderoga museum no doubt comes from the restructuring of the medical department in early 1777. The names and ranks correspond to those established as part of that reformation of the department.

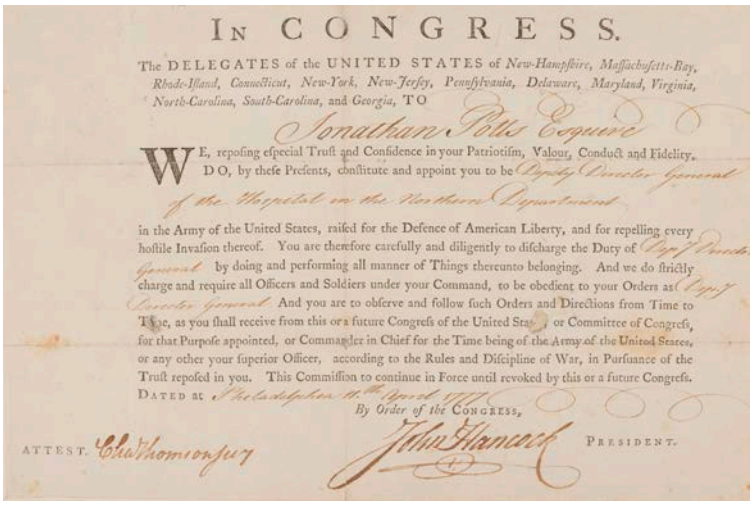


The committee made their final report on November 27, 1776. If they visited the temporary medical facilities at Ticonderoga, they did not note it. They clarified the situation at Fort George, where the bulk of the very ill were being treated. They found 400 patients, including casualties from the naval actions on Lake Champlain, generally well supplied with food and finally, it seems, with medicine. Nevertheless, they noted that "the Sick suffered much for Want of good female Nurses and comfortable Bedding: many of those poor Creatures being obliged to lay upon the bare Boards." In the short term they sought to alleviate the soldier's immediate lack of beds, but also recommended larger changes that would concentrate most care at Ticonderoga. The hospital at Fort George would still serve for contagious disease, "but your Committee are clearly of Opinion that the General Hospital for the Army stationed at Tyconderoga ought to be erected on the opposite Grounds,

called Mount Independence, Fort George being at much too great a Distance."[49]

The pressures on Ticonderoga's meagre medical facilities and shortage of drugs was eased somewhat over the winter – not through new buildings or deliveries of supplies, but simply because the army shrank. From nearly 15,000 men by October it was less than 3,000 men, and over a third were unhealthy.[36] As winter began Ebenezer Elmer, a subaltern in Colonel Dayton's 3rd New Jersey Regiment, recorded a decrease in dysentery during the colder months and "not many however die." Before the new year this had changed, and he noted that his men were "in general very sickly. Scarcely a day passes but some one dies out of it."[57] The report of the congressional committee and the reorganization of the medical department over the winter attempted to bring the army into the field in 1777 in a better condition.

Fig 2. Jonathan Potts Commission, April 11, 1777. (Fort Ticonderoga Museum Collection, MS.2115) Pott's April 11, 1777 commission as "Deputy Director General of the Hospital in the Northern Department" bears the President of Congress' familiar signature. It is part of the Pott's papers held at Fort Ticonderoga.



IN CONGRESS.

The DELEGATES of the UNITED STATES of *New-Hampshire, Massachusetts-Bay, Rhode-Island, Connecticut, New-York, New-Jersey, Pennsylvania, Delaware, Maryland, Virginia, North-Carolina, South-Carolina,* and *Georgia,* TO

Jonathan Potts Esquire

WE, reposing especial Trust and Confidence in your Patriotism, Valour, Conduct and Fidelity, DO, by these Presents, constitute and appoint you to be *Deputy Director General of the Hospital in the Northern Department*

in the Army of the United States, raised for the Defence of American Liberty, and for repelling every hostile Invasion thereof. You are therefore carefully and diligently to discharge the Duty of *Deputy Director General* by doing and performing all manner of Things thereunto belonging. And we do strictly charge and require all Officers and Soldiers under your Command, to be obedient to your Orders as *Deputy Director General*. And you are to observe and follow such Orders and Directions from Time to Time, as you shall receive from this or a future Congress of the United States, or Committee of Congress, for that Purpose appointed, or Commander in Chief for the Time being of the Army of the United States, or any other your superior Officer, according to the Rules and Discipline of War, in Pursuance of the Trust reposed in you. This Commission to continue in Force until revoked by this or a future Congress.

DATED at *Philadelphia the 11th day of April* 1777.

By Order of the CONGRESS,

ATTEST. *Chas Thomson Secy* *John Hancock* PRESIDENT.

1777: ADMITTED, TOO LATE

The campaign of 1776 was a strategic success. The British invasion of the north was blunted at Ticonderoga and smallpox was largely contained. Despite this, dysentery reigned over the summer. As winter came it diminished, replaced by "more inflammatory disorders of a very complex nature" which continued to impact the army going into 1777.[57] This was compounded by deficiencies in other resources and the still unresolved authority of congressionally appointed medical department staff and regimental surgeons, to say nothing of the political disputes within the service.[1] Reorganization over the winter finally addressed many of the issues that had been plaguing the army's medical department.

At Ticonderoga, still without a purpose-built hospital facility, men continued to suffer. Colonel Anthony Wayne who commanded the garrison over the winter lamented "the dead and the dying lying mingled together in our hospital or rather house of carnage is no uncommon sight."[54] Over the winter smallpox reappeared and Wayne reiterated orders from General Gates the previous year to physically separate infected men by sending them to Fort George, swearing that they were not inoculating themselves privately, risking an uncontrolled spread, but that they acquired the disease naturally.[58] As the Fort George facilities were closed very sick men were ordered to Albany where better care could be provided.[59,60,58]

On January 9, 1777, both Doctors John Morgan and Samuel Stringer were dismissed from their posts. Although this left the department leaderless for over three months Congress, with the assistance of William Shippen and John Cochran, completely reorganized the department by early April on the British model. It would continue to evolve, but the basics provided a clear Director General who oversaw subordinate regional departments each with their own staff of physicians and surgeons for operations.[1] The reorganized department also attempted to established authority for working with regimental surgeons, a problematic omission from the first years of the war, which continued until war's end. Although reformed, challenges would continue to plague the Hospital Department throughout the war. One of the immediate results, however, was the stalwart Jonathan Potts, who had

Fig 5. Detail, Plan of Ticonderoga and Mount Independence…, surveyed by Charles Wintersmith, copied by Richard Hockings and Charles Terrot, 1777.

returned to Pennsylvania to recover from an illness, being appointed Deputy Director General of the Hospital in the Northern Department (Fig. 4).

Potts built his staff (Fig. 5).[8]James Thacher, a regimental surgeon for Colonel Whitcomb's 6th Continental Regiment from Massachusetts, was nearing the expiration of his regiment's service. He recalled that he "received an invitation from Dr Jonathan Potts, the surgeon general in this department, to accept the office of surgeon's mate in the general hospital."[51] Thacher appears alongside six senior surgeons, eleven second surgeons and surgeon's mates, commissaries, stewards, a clerk, an Apothecary General, a Physician General, Surgeon General, and a unified Physician and Surgeon General "to the Army" who would oversee regimental surgeons.

A major accomplishment of the 1777 campaign that accompanied this restructuring of the department was finally the creation of a physical General Hospital at Ticonderoga. Work began on a new hospital building even before the congressional reformation of the medical department was complete. Jeduthan Baldwin, the chief engineer at the post, was ordered in mid-February "to lose no time in preparing and collecting the materials for a hospital, sufficiently large to contain six hundred sick, besides the necessary apartments for the Director, and the other officers of the hospital."[61] This was to be a structure on a new scale, taking into account the needs of the sick as well as the staff of the medical department. Dutifully Baldwin recorded in his diary on March 12, 1777 that he "Drawd. Plans for Hospital." This was the origin of the first dedicated hospital structure at Ticonderoga.

Following the recommendations of the 1776 congressional committee that "The General Hospital for the Future to be upon Mount Independence," Baldwin began his work there.[49] Across the Lake from Ticonderoga, Mount Independence had been cleared in 1776 and garrisoned by three Continental brigades. The dispersal of the vast army of 1776 provided a large amount of clear ground to erect a large building. Construction began on May 5, proceeded by months of logging and hewing for beams. One side was raised by May 27, and by June 9 it was complete enough for Baldwin to breakfast with the medical staff in the new Hospital. Sadly, in less than a month the entire post at Ticonderoga was abandoned.[50]

Archaeological investigations followed by excavations in 1989 and 1990 have uncovered the site of the short-lived General Hospital built in 1777. Nothing remains of the building itself save foundation stones and the remains of multiple hearths and chimneys, but it was clearly a substantial structure. The archaeological work determined that the building was 250 feet long by 25 feet wide, furnished with four hearths for as many as 16 fireplaces across its two stories. Based on preparations for footings, another wing was planned but never completed by the time the Continental Army evacuated Ticonderoga in the morning of July 6, 1777.[8]

The relatively late completion of the framing of the building meant it hardly function as a hospital. General Philip Schuyler complained as late as June 25, less than two weeks before the fort was evacuated, that "not one single room in the hospital is yet finished."[61]The sickest men were already ordered south to Fort George, and British ships had been spotted at Crown Point advancing to lay siege to Ticonderoga.

The Continentals defied the British, engaging their advanced guard and shelling the naval forces from shore batteries. But their outnumbered forces were enveloped by British troops on the Ticonderoga side of Lake Champlain and Germans on the Mount Independence side. At the eleventh hour, General Arthur St. Clair, now in command, ordered the evacuation of their positions entirely. Surgeon's Mate Thacher was woken in the middle of the night and hastily ordered "to collect the sick and wounded, and as much of the hospital stores as possible, and assist in embarking them on board the batteau."[51] The army's sick retreated by way of Lake Champlain to Skenesborough as the British pursued.

Thus ended the American military's medical presence on Lake Champlain. Maybe as few as 100 sick men were left to evacuate on July 6, 1777. Care had not improved but the garrison was substantially smaller and the sickest men had been moved in late June. Unfortunately, the reformed medical department and the new facilities on Mount Independence were never fully tested. Historians are left to wonder if they might have contributed to better conditions for the men at Ticonderoga.[62]

Instead the British benefitted from the hospital at Mount Independence. Although they did not capture all of its valuable stores, they used the building through early November of 1777. Nearly three times more British and German troops (as well as some American prisoners) came through the hospital than the Continentals treated there.[63] Even with the better hospital facilities, officers in the allied Brunswick corps criticized British preparations for moving casualties from the site of the Battle at Hubbardton to the hospital. Lacking the planning and systems of the Prussian medical services they felt put the wounded in greater danger. Still, the British seem to have fared far better than the Americans, but the surrender at Saratoga in October of 1777 precipitated the final British evacuation of Ticonderoga and the end of military, and medical, activity at Ticonderoga.[64]

A MILITARY ANAMNESIS

Medical care at Fort Ticonderoga mirrored the site's broader experience in the American Revolution. Ticonderoga's capture in May of 1775 precipitated a shift in the conduct of the war. No longer solely defensive, the capture of a British fortification in the interior opened a new theater of the war. It brought together more players, from various colonies, as well as the Congress and the newly created Continental Army. These varying authorities struggled to achieve consensus or operational synchronicity. Even before the posts on Lake Champlain were fully consolidated the invasion of Canada exacerbated logistics and the meagre capabilities of the Continental forces.

The failure of that invasion forced the army to consolidate. Despite inefficiencies, and rivalries, the preparations undertaken at Ticonderoga paid off when the British failed to force the fortifications. This is significant. The lack of a pitched engagement spared the lives and limbs of thousands of American soldiers, which in addition to disease may have swamped the already stressed medical systems of the Continental Army, already suffering from a lack of supplies, facilities, and staff. Finally, by 1777, the pieces were in play for a more systematic approach to medical care, both administratively and physically. The aggressive British advance ended American efforts to improve care at Ticonderoga.

Nevertheless, the events at Ticonderoga gave the Continental Army valuable experience, not just in the management of medical affairs, but in a broader sense what was needed to wage a war on a continental scale. The necessity of working across colonial – and later state – lines, creating clear hierarchies, and the important of logistics were all valuable lessons. Not all these lessons were learned, nor would they all be remembered, but Ticonderoga's wartime experience left an indelible mark on American history.

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Primary Sources

Sanders Marble, PhD

Primary sources are the lifeblood of history. Defined as sources created contemporaneously with the events under investigation, they range from official documents to letters, diaries, artwork, newspaper clippings, songs or any other human creation that records some essence of transpiring events. Historians use these primary sources to reconstruct accurately what happened, and why. Memories are at best faulty, and subsequent accounts inherently assume the subjective slant of their authors. Only primary sources present the possibility of truth as seen through the eyes of participants. This does not mean all primary sources are inherently accurate, objective, or correct. They suffer from the same biases, inconsistencies, and mistakes that plague later accounts. Moreover, written in the moment, they lack the perspective subsequent observers can provide. What might seem critically important at the time may, in hindsight, be irrelevant, and vice-versa. And yet, because they are generated in the moment, they afford otherwise inaccessible access to thoughts, opinions, and beliefs of the men and women living through the events in question. Thus, historians must rely on a constellation of primary sources, situated within a rich historiography, to interrogate, analyze, and detail the past.

In this section, we provide three primary sources on military medicine in the American Revolution:

John Jones, an unusually well-trained New York surgeon, published the first American textbook of surgery in 1775. Intentionally kept short and practical, Jones sought to teach American doctors, most of whom had little experience managing major injuries, the fundamentals of combat surgery.

Benjamin Rush, one of America's most famous physician-patriots and Declaration of Independence signatories, served as surgeon-general of the Middle Department of the Continental Army. His influential *Directions for Preserving the Health of Soldiers* (1777) instructed line and medical officers alike in the importance and execution of public health measures to preserve the fighting strength.

Baron von Steuben, a Prussian Captain promoted to Major General by General Washington, became famous for helping organize the Continental Army. He prepared *Regulation for the Order and Discipline of the Troops* (1779) in which he defined the military officer's responsibility for the health of his forces. Recognizing how diseases markedly diminished an army's strength, von Steuben regarded their control as critical a duty for line officers as proper troop maneuvers.

The enduring gems are the original words of von Steuben, Rush, and Jones. We hope perusing through their passages, declamations, and turns of phrases provides insight in the medical history of the American Revolution. Enjoy.

"BALM IN HER BLEEDING WOUNDS". THE SURGICAL TEXTBOOK OF JOHN JONES

Justin Barr, MD, PhD

INTRODUCTION

At the start of the Revolution, fewer than 10% of American doctors possessed a medical degree; fewer still possessed much experience treating gunshot wounds.[1] John Jones was an exception. Remarkably well educated in Philadelphia and Europe, Jones returned to North America where he helped found the second medical school in the colonies and later wrote a textbook on military surgery that served as manual for these military surgeons trying to minister to the sick and wounded soldiers of the Continental Army. After briefly introducing Jones and his book, we will reproduce the chapter on managing of gunshot wounds, complete with explanatory footnotes. A conclusion will place Jones' work in conversion with contemporary, European military medical textbooks.

BIOGRAPHY

John Jones was born in 1729 in Jamaica, New York to a family of Welsh Quakers; his father and both grandfathers were physicians.[2,3] Following private school in New York City, Jones apprenticed with his cousin, Thomas Cadwallader, a British-trained physician in Philadelphia.[4] Three years later, Jones took the unusual step of continuing his education in Europe. First stopping in London, he attended the lectures of the famous accoucheurs Richard James Mackenzie and William Hunter; his soon-to-be famous brother John Hunter was but a year older than Jones and likely a friend.[5] Several months with Percival Pott at St. Bartholomew's hospital followed, with Jones forming a particularly close relationship with his surgical teacher.[6] He

decamped for France in 1751, earning his MD degree at the University of Rheims, with a thesis entitled *Observation of Wounds.* Moving to Paris, Jones walked the wards of the famed *Hotel Dieu* with Henri Le Dran and Claude-Nicolae Le Cat, both famous surgeons, lithotomists, and military physicians. He continued his European tour with stops in Leiden, learning from the famed anatomist Albinus, and Edinburgh, where he studied under the Monro dynasty.[.] Visiting every leading medical center in Europe over two years, Jones obtained a remarkable and highly unusual education. Most American practitioners managed a brief apprenticeship, and even that was not required.[.] This advanced training distinguished Jones and prepared him to assume a leading role in Colonial medicine; it was later reflected in his seminal work.

Jones returned to New York City, where he set up his practice. Focusing chiefly on surgery, and particularly lithotomies, he quickly developed an august reputation. Despite this success, he volunteered to serve as a physician in the French and Indian War, participating in the Battle of Lake George. At this engagement, he famously treated the French commander, General Jean Erdman, Baron Dieskau, effectively managing the wounds while further increasing his renown.[.] Jones must have recognized the educational deficits of the colony, and, in 1767, he and a few colleagues petitioned King's (now Columbia) College to open a medical school. Approved that year, King's College hosted just the second medical school in America; Jones was the inaugural professor of surgery.[1.] Hospitals were similarly scarce. Jones and his colleagues successfully obtained a Royal Charter to construct one in Manhattan, and in 1774 he traveled to England to help raise funds for the planned hospital. While there, he met again with his mentor Pott, who bestowed not only his blessings but also a complete copy of his lectures. When Jones returned to New York, a fire burned down the just-completed hospital building. Soon thereafter, Jones fled the city, his home, and his practice just before the British seized complete control. Most of King's College faculty, still supporting the Crown, remained.

Following a brief unremarkable term in the New York Senate, Jones volunteered for the Continental Army in 1777. He served first as a surgeon's mate then a surgeon to the 10th Massachusetts Regiment, although field service aggravated his asthma. Transferred to Philadelphia, he settled there, eventually resigning from the Army in 1781. Again establishing a renowned surgical practice, Jones quickly accrued honors in his new city, including appointment to the Pennsylvania Hospital, Presidency of the Humane Society, and Vice-President of the College of Physicians. He became the personal physician to Benjamin Franklin, caring for him through his final days, and, following the cessation of hostilities, to George Washington.[1.] It was upon making a house call to General Washington that Jones contracted what was likely pneumonia, dying at home in 1791. A lifelong bachelor, he was buried in Philadelphia.

Jones published his famous text *Plain Concise Practical Remarks on the Treatment of Wounds and Fractures* in 1775 in New York; a second, more widely distributed edition was printed a year later in Philadelphia.[1.] It received immediate acclaim.[1.] In an era when surgical texts droned on for hundreds of pages, Jones' tract adhered to its title. plain and concise, it contained only 92 pages. In an age before cargo pockets, this had added value by being portable. The *vade mecum*, explicitly written for American military physicians, eschewed discursions on theories in favor of direct, applicable instructions. Jones consciously focused this work on what field surgeons would need to know.[1.] Despite his private practice specializing in lithotomies and childbirth, neither those pathologies nor procedures appear in his text; this is military surgery. A powerful introduction lays out the "proper duties and qualifications of a good surgeon," and, unusually for the era, argues vehemently for the unification of medicine and surgery. As evident from the table of contents below, Jones approached topics not by organ system or physiology but rather by the particular problems military surgeons would encounter.

- Chapter 1. Wounds in General
- Chapter 2. Of Inflammation
- Chapter 3. Of the Division of Wounds
- Chapter 4. Of Penetrating Wounds of the Thorax and Abdomen
- Chapter 5. Of Simple Fractures of the Limbs
- Chapter 5 [sic]. Of Compound Fractures
- Chapter 6. On Amputation
- Chapter 7. Of Blows to the Head
- Chapter 8. Of Injuries Arising from Concussion or Commotion
- Chapter 9. Of Injuries Arising from a Fracture of the Skull
- Chapter 10. Of Gunshot Wounds
- An Appendix Containing some Short Hints on the Structure and Economy of Hospitals Particularly Applied to Military Ones, with the General Means of Preserving Health in an Army

Chapter 10 follows, transcribed from 1775 edition, with original spelling and grammar.

Chapter 10: of gunshot wounds. (1775)

The first intention, with regard to wounds made by a musket or pistol ball, is, if possible, to extract the ball, or any other extraneous bodies lodged in the wounded part. The next object of attention, is the hemorrhage, which must be restrained, if practicable, by tying up the vessel with a

proper ligature; as no styptic is to be relied on, exclusive of the mischief they otherwise occasion.

In order to extract the ball, or foreign body, Mr. Ranby, and Mons. Le Dran, whose judgment and experience in these cases are certainly superior to most men's, advise as little search, with the probe or forceps as possible, as all irritation on these occasions increases the consequent pain and inflammation. [John Ranby and Henri Le Dran were eminent European surgeons.] Mr. Ranby is of opinion we ought not to attempt the extraction of any thing which lies beyond the reach of the finger, though if the ball can be felt under the skin, in an opposite direction to the wound, it ought immediately to be cut upon and taken out. As the external wound made by a musket ball is very narrow, the orifice should be considerably dilated, and that on both sides, when it has penetrated through any part of the body or limbs, particularly the most depending orifice: yet in wounds near the joint, or in the very membranous or tendinous parts, the knife as well as forceps should be put under some restraint, and no more dilation made, than what is absolutely necessary for the free discharge of the matter lodged within; for we know from experience, that wounds about the joints, are always attended with great pain and inflammation, are always disposed to shoot out fungus flesh, and forms new abscesses round all the adjacent parts. The air too, seems to produce worse effects upon membranous and nervous parts, than those which are more fleshy; for all which reasons the young Surgeon should be very cautious in wounding them. [At the time of the American Revolution, physicians theorized that air pushed into a wound would harm a patient by disturbing the balance of their humors. It would be debunked in the 1790s.] The first dressings to a gunshot wound, should be light, easy and superficial, with a barely retentive bandage, which ought to be made of soft flannel rather than linen; if the lint be dipped in oil, it will not only set much easier on the wound, but allow a freer discharge to the extravasated fluids, which nature always endeavors to expel as early as possible. At the second dressing, some mild digestive may be used, and where the wound is large, the bread and milk poultice, or one composed of the farina lini [linseed oil], overall; and if much tension and inflammation attend, an emollient fomentation will be very necessary. Though these symptoms will be very much lessened, if when we are first called in, a proper quantity of blood is taken from the patient, his body kept open by clysters and gentle purgatives, an easy perspiration promoted, and in general a cool, moderate regimen prescribed, avoiding everything hot or spirituous, either internally or externally, which during the state of inflammation is extremely injurious to the wounds. [All these interventions, designed to remove agitated humors/fluids, were believed to prevent/treat inflammation. Contemporary physicians believed that, after bleeding, this systemic inflammation was the greatest threat to the trauma patient's life. It does not have a modern correlate and likely represents some combination of shock and infection.]Nor should the surgeon, if not called in until the inflammation is come on, attempt to remove any extraneous bodies before it is almost entirely abated, and a good digestion appear; unless the foreign body lies so near as to render its extraction certain, without much pain or difficulty.

If a wound be as such a desperate nature as to require amputation, which is frequently the case where it happens in a large joint, it is of the utmost importance to perform the operation immediately; as the consequent pain and inflammation, renders it improper during these symptoms; and, when they are past, the patient is often reduced to so low and weak a state, as to make an amputation a very dangerous and doubtful operation. [Military surgeons of the era debated whether it was better to amputate early or delay, even several days, until a patient was more stable.. Wounds, that border on any considerable artery, are very apt to bleed afresh upon motion, or the return of a free circulation of the blood into the parts; and this is frequently the case when the crust and slough begins to separate, for which reason one should never attempt to remove it by force, but wait with patience until there is a perfect separation of the slough. The Surgeon in the mean time should be on his guard against this accident of a second hemorrhage, which is frequently indicated by the patient's complaining of a greater weight and fullness in the limb, attended with more or less pulsation in the wounded part; which latter is an almost infallible sign of the approaching danger, to obviate which, recourse must be had to bleeding and the bark. [Cinchona bark, containing quinine, that caused vasoconstriction and reduced inflammation.] Mr. Ranby says he has known many instances of persons losing their lives from the bursting of an artery after amputation, and affirms, that in some of the cases, which proved mortal, not above twelve ounces of blood were lost, which appears very extraordinary, and almost unaccountable, unless from the previous hemorrhage, and broken texture of the blood, by which a sudden gush may give such a check to the circulation, as to cause immediate death. This observation ought to be a lesson of instruction to the young Surgeon, to be particularly attentive in securing every vessel with a proper ligature. For this reason too, repeated bleedings in the beginning of an inflammation, or rather before it, are attended with such beneficial consequences; they generally prevent, and always lessen the fever and inflammation, and consequently those impostumations [abscesses], which generally attend them. Mild laxative medicines contribute greatly to answer to the same purposes, and to remove the rack of pain, recourse must be had to the sovereign and almost divine power of opium, next to which, the bark may be added, as a medicine, which, Mr. Ranby says, no human eloquence can deck with panegyric proportionable to its virtues. He declares, he has known it procure rest, if given in large doses, when

opium had been taken away without any effect. In all large wounds, particularly those made by a cannonball, there is constantly a laceration of the membranes and exquisitely sensible parts, which are ever attended with excruciating pain, and a great discharge of gleety matter [pus], which if not restrained, proves of the most dangerous consequence; under these unhappy circumstances, the bark given in the quantity of a dram every three hours, or oftener if the stomach will bear it, has a most surprising efficacy in removing these terrible symptoms.

The elixir of vitriol taken three or four times a day in a glass of water, is in these cases of singular benefit, and proves a very good assistant to the virtues of the bark. If the body be costive [constipated], a few grains of rhubarb may be added to each dose of the bark, till that inconveniency is removed; but on the contrary, if the bark should run off in more than three or four successive stools, its operation that way must be checked by a few drops of the tincturea thebaica [opium], or a spoonful of the Diascordium mixture [a widely-used herbal preparation], given in each dose. From what has been said, it is evident, that the bark is one of the best remedies hitherto discovered, for contracting the vessels, and restoring their due action upon the blood, when too great a quantity of that necessary fluid is lost by a profuse hemorrhage, provided the larger wounded vessels are secured by a proper ligature from future bleeding. It also not only secures the most tender solids and small vessels from being dissolved by the acrimony of any matter absorbed and returned into the whole mass of blood, from large wounds or latent abscesses, but it likewise preserves the texture of the blood itself, from being too much broken, or rendered too watery from the same cause, which would otherwise inevitably produce a fatal, colliquative hectic. But where there is too great a fullness, or too much strength and contractile force in the solids, and an inflammatory state of the system, it may occasion obstructions, pain, inflammations, and their consequences, unless it be timely laid aside, upon the appearance of such effects. [Here, Jones reflects on different schools of physiological thought, highlighting a surgeon's frustration with either's ability to explain fully the effect of GSWs on patients. a version of neo-humoralism that focused on the liquid composition of the body, and solidism, which concentrated on solid organs and more physical forces.]

Fractures of the bones of the limbs by a musket ball, are attended with the same general symptoms of other compound fractures, the proper treatment of which, has already been pretty fully explained in the chapter upon that subject; for which reason I need not here repeat what has been there said.

It sometimes happens that two balls pass into a limb, making only one orifice where they entered, and afterwards diverging in their course, form two openings on the opposite side. In such cases, if the two orifices are pretty near each other, they ought to be laid into one, in order to facilitate the discharge of extraneous bodies or matter that may be lodged in the wound.

Where there is reason to suspect, from the course of the ball, that so large an artery is wounded as to occasion a dangerous hemorrhage; upon the approach of the symptomatic fever, and removal of the eschar, the tourniquet ought to be left loose about the limb, with directions to the patient or some person near him, to tighten it in case of bleeding, until the surgeon comes to his assistance. [This is almost certainly a reference to the screw tourniquet first described by by Jean-Louis Petit in the 1740s.]

When the os humeri is fractured, after making the necessary dilatations, and extracting such loose splinters as can safely be disengaged from the muscles, the wound being dressed in the usual way, the bones must be preserved in the most apposite situation by means of the hollow splints recommended in the chapter upon simple fractures, only with this difference, that openings must be made in them opposite to the wound, to admit the application of the dressings, and afford free discharge to the matter, without removing the splints, which would unavoidably excite pain and inflammation, by disturbing the position of the bones.

Monsieur Le Dran, lays it down as a general rule, never to attempt saving the leg, when the bones of the tarsus are fractured by a musket ball; for as the tendinous and ligamentous structure of the part, does not admit of the necessary dilatations, the consequent fever and inflammation proves fatal in almost every case; immediate amputation is therefore the most advisable practice.

A leg or an arm is frequently carried off by a cannonball, which accident generally leaves the extremities of the bones as well as tendons in so shattered a state, as to render amputation necessary. When this happens to be the case, so much of the limb ought to be preserved, as is consistent with the nature of the injury; but the operation should always be performed high enough to leave no loose fractured bones above the amputated part.

A complaint of a very singular nature, known by the name of an Emphysema, is sometimes the consequence of a fractured rib, either from blows, falls, or a musket ball passing in an oblique direction, so as to fracture the rib without entering into the cavity of the thorax; and this complaint is occasioned by small sharp points of the fractured rib, wounding the vesicular part of the substance of the lungs, so as to permit the air to pass into the cavity of the thorax,

where being retained, it induces such a degree of difficulty in respiration, by compressing the lobes of the lung, as sometimes to terminate in an absolute suffocation. [Here Jones described the modern pathology of a tension pneumothorax.. The only remedy, capable of affording effectual relief in so distressing a situation, is, to perform the operation of the paracentesis thoracis or opening into the cavity of the chest, through which the confined air may be discharged. This opening may be made without much difficulty or danger, by dividing the integument something better than half an inch in length, and then cautiously pursuing the dissection through the intercostal muscles and pleura, with the point of the scalpel. There is no danger of wounding the lungs under such circumstances, as they are sufficiently compressed by the air in the chest to keep them out of the way of the knife.

But when the wound made in the pleura by the points of the fractured ribs, is large enough to permit the air to rush freely out of the cavity of the thorax, it passes into the cellular membrane, and sometimes distends it to a monstrous size, extending over great part of the body, face, and limbs. The proper remedies in this species of disease, are small fenestrations, made with the knife or lancet, into the cellular membrane, and then compressing the integument so as to force out the confined air. [This is the condition now referred to as subcutaneous emphysema.] Repeated bleeding in both species of emphysema, and particularly the last, is necessary to relieve the urgency of the symptoms, which are sometimes very severe and oppressive; the emphysematous tumor of the cellular membrane, often lasting several days, before it entirely subsides.

There is so much affinity between wounds made by firearms, and burns, that I shall conclude the present subject with a few observations on the latter. Burns have generally been considered as a distinct species of sores; and the idea of fire remaining in the burnt part, has given rise to a great many whimsical applications, which the more rational theory of the present Surgery has very rightly rejected. Superficial burns or scalds, which penetrate no deeper than the cuticle, are most effectually and speedily relieved by the immediate application of spirit of wine. But when they produce vesications, some soft, mild application, such as linseed oil, or a cerate of oil, wax, and spermaceti, are necessary to heal the excoriated parts. When they penetrate still deeper, and the true skin and membrana adiposa down to the muscles are affected, and slough away, a different method of treatment is to be made use of. In these last circumstances, where the burn or scald has extended itself over an entire limb, or a large surface of the body, a violent inflammation immediately ensues, attended with most exquisite pain, and sometimes even convulsions. Bleeding in such cases, according to the age and strength of the patient, must precede every other remedy; the body must be kept open by clysters and gentle purgative medicines, and the parts affected covered with an emollient poultice, and fomented twice a day or oftener with anodyne fomentations, till the mortified parts begin to slough away, when they may be dressed with some mild digestive, though such an exquisite tenderness affects large burns, that very few ointments are applied, which not irritate them. One of the most successful I have ever tried, is the unguentem e stramonio, prepared by boiling the leaves of the stramonium, or thorn-apple in fresh hog's lard, till the lard will take up no more of the juice; and then adding as much wax as will give a sufficient degree of confidence to withstand the summer's heat. This ointment is possessed of an anodyne quality, which renders it the easiest application during the whole state of inflammation, which, with the extreme slowness of cicatrization, generally lasts long enough to tire both the patient and Surgeon. For, where the burn or scald is extensive, the elongation of the sound skin is produced with great difficulty, and is extremely apt to break open upon the slightest occasion; the ulcer too, by remaining so long open, is very much disposed to shoot out into fungous excrescences, which are with great difficulty kept down by mild escharotics, such as the Roman vitriol, aq. calcis, or even lunar caustic and the pulvis angelicus, for dry lint adheres so closely, that you cannot remove it at every dressing, and the fungus shoots up amazingly if not corrected daily by some or other of the escharotics just mentioned, even though you should apply a well adapted roller, which is highly necessary and useful, to prevent this luxuriant growth of flesh, and preserve the parts from unseemly scars.

A strict regimen is very necessary in these severe cases, which are sometimes so obstinately slow, that a twelve month will elapse before you can entirely heal some of them.

ANALYSIS AND CONCLUSIONS

Supporters hail Jones' work as an original American masterpiece; critics denounce it for being a derivative synthesis of existing scholarship; they are both correct. The general outline arises from his course of lectures at King's College, which themselves are based chiefly on his European education.[1.] The first chapter in his book, for example, on "wounds in general," summarizes his seventh lecture, which draws heavily from Boerhaave's teachings that Jones presumably assimilated during his stay in Leiden.[1.] The chapters on fractures and amputations clearly herald from Pott's lectures (as evident from his 1779 textbook), although Jones departs from his mentor by denying that all compound fractures required prompt amputation.[1.] Most of his conclusions on injuries to the head, chest, and abdomen summarize those of his French teacher, Le Dran, including the utility of trephining, for which Le Dran and Jones advocated at a time when the procedure remained controversial.[1.] The appendix on camp hygiene summarizes the lessons of John Pringle and contains the then-standard recommendations regarding latrine positioning, camp organization, and the like.[19]

In the chapter on gunshot wounds, Jones cites the scholarship of John Ranby and Henri Le Dran. Ranby and Le Dran had fought in Europe while Jones campaigned in America during the Seven Years War, so they each gained practical experience on which to base their conclusions. Much of Jones' text comes from Ranby's 1744 (reprinted 1760) work, with entire paragraphs copied almost verbatim.[2.] Recommendations like the bread and milk poultice and especially the value of Peruvian bark in nearly every case derive directly from Ranby. Lessons on managing traumatic pneumothorax are taken from Le Dran. Interestingly, neither Ranby nor Le Dran contain much on burns; Jones' section does not shed new light on the pathology but reflected other sources and exposure to his own patients. All three authors caution surgeons against blindly probing for and extracting projectiles not readily accessible. They champion ligating bleeding vessels instead of using styptics or compression, warning against the possibility of secondary hemorrhage. Cautery goes unmentioned.

While military surgeons such as John Hunter and Johann Bilguer strongly advocated for delayed operation, allowing the patient either to succumb or survive the initial wounding, Jones, following the recommendations of Le Dran and Ranby, insisted on prompt surgery, ideally on the battlefield.[21-2.] At a time with much debate over what, if any, poultices should be applied, this trio of surgeons recommended plain lint dressings.[2.] While Le Dran is classically associated with concern over the physiological consequences of being shot, coining the term "shock," all three authors stressed the importance of managing the systemic inflammation that followed gunshot wounds.[2.] They recommending copious bleeding, enemata, and sudorifics to remove the excesses believed to sicken and kill the wounded soldiers. The general confluence of opinions demonstrates how Jones's text provides standard-of-care recommendations for the 18th Century.

Most Americans did not get to learn from the leading lights in Europe; Jones did. Most Americans lacked the opportunity to walk the wards of Hotel Dieu and St. Bartholomew's Hospital; Jones did. Most Americans did not get to practice operations repeatedly on cadavers; Jones did. And while Continental surgeons had access to copies of Ranby's and Le Dran's (translated) works, we should not underestimate the inherent pride and psychological benefits of reading an American book by an American author during the American Revolution. True, Jones contributed few genuinely novel observations. But he successfully and effectively summarized contemporary practice, combined with his personal experience, into a single, slender, useful volume – an impressive and important achievement.

It is impossible to determine how many colonial physicians read the text or whether they applied the lessons therein, but its widespread distribution and subsequent acclaim suggest substantial utilization. Jones' impressive reputation before the war – he and William Shippen were the most famous surgeons in America – combined with the concise, straightforward lessons rendered it both appealing and immediately applicable.[2.] Nonetheless, it is important to note that disease, not gunshot wounds, caused the vast majority of morbidity and mortality in the Revolutionary War; numbers are rough estimates, but Louis Duncan figured that 90% of American fatalities resulted from disease, not trauma.[2.] These statistics accord with other period conflicts.[2.]

Jones published the first American textbook of surgery in 1775, a time of tremendous turmoil in America, and the second American surgical textbook did not appear until 1813.[2.] Like many Colonials, he opposed taxation without representation but, through the early 1770s, preferred to remain part of the British Empire.[2.] Soon after he returned from his second European trip, relations deteriorated into armed conflict, and Jones did not hesitate to choose a side, declaring himself "willing to share my country's fate, whatever it may be."[2.] He authored his textbook in express support for the American Revolution, in hopes that it would save lives and further the cause of independence. Declaring "few men are possessed of those superior talents, which, are now required, to heal such mighty evils as now threaten the whole body politic with ruin and desolation," he offered his surgical wisdom and experience as a partial remedy, a "balm into her bleeding wounds."[1.] Surely his words helped staunch some hemorrhage in the birth of this new nation.

Benjamin Rush Pamphlet.

Fatal experience has taught the people of America that a greater proportion of men have perished with sickness in our armies than have fallen by the sword. The two last campaigns produced melancholy proofs of this assertion. But we ought to consider upon this occasion, not only the mere loss of those worthy citizens who perished in this manner. The complicated distress, which accompanied their sickness and death, should never be forgotten. The gallant youth who had torn himself from the arms of his parents, or the partner of his joys, who had plighted his life to his country in the field, and who perhaps, in the enthusiasm of his military ardor, has courted death from a musket or a cannon ball, was often forced from the scene of action and glory by the attack of a fever, and obliged to languish for days or weeks in a hospital; and, at last, to close his eyes, deprived of the sweet consolation of a dying soldier, the thoughts of ending his life in the arms of victory, or in an act of just resentment against the enemies of the liberties of his country.

The munificence of the congress has made the most ample provision for lessening the calamities of war from sickness in their armies, and, if possible, to prevent it altogether; for I maintain that the mortality from sickness in camps is not necessarily connected with a soldier's life: It was unknown to the armies of ancient Greece and Rome. Their armies had no diseases peculiar to themselves; nor were the diseases, to which their soldiers were subject, attended with any peculiar symptoms. But the munificence of the congress, and the skill of physicians and surgeons, will avail but little in preventing mortality from sickness among our soldiers, without the concurrence of the officers of the army. Your authority, gentlemen, is absolutely necessary to enforce the most salutary plan, and precepts for preserving the health of the soldiers. Your own personal safety is concerned in concur ring in the plan adopted by the congress. But if this were not the case, I am persuaded humanity and patriotism would not plead in vain in favour of those brave men, whose lives are committed to your care by the suffrages of your country.

The art of preserving the health of a soldier consists in attending to the following particulars: 1 Dress. 2 Diet. 3 Cleanliness. 4 Encampments. And, 5 Exercise.

1. The *Dress* of a soldier has a great influence upon his health. It is to be lamented, that the peculiar situation of our country, from the infancy of our foreign trade and domestic manufactures, has obliged us to clothe our soldiers chiefly in linen. It is a well known fact, that the perspiration of the body, by attaching itself to linen, and afterwards, by mixing with rain, is disposed to form miasmata, which produce fevers. Upon this account I could wish the rifle shirt was banished from our army. Besides accumulating putrid miasmata, it conceals filth, and prevents a due regard being paid to cleanliness. The Roman soldiers wore flannel shirts next to their skins. This was one among other causes of the healthiness of the Roman armies. During the last war in America, general (then colonel) Gage obliged the soldiers of his regiment to wear flannel shirts, from an accidental want of linen; and it was remarkable, during a sickly campaign on the lakes, not a single soldier, belonging to that regiment was ever seen in any of the military hospitals. I have known several instances where the yearly visits of the intermitting fever have been checked in the state of Pennsylvania, in places most subject to that disease, by nothing else but the use of flannel shirts.

The hair, by being long uncombed, is apt to accumulate the perspiration of the head, which by becoming putrid sometimes produces diseases. There are two methods of guarding against this evil: the first is by combing and dressing the hair every day; the second is by wearing it thin and short in the neck. The former is attended with de lays often incompatible with the duty of a soldier; and therefore the latter is to be preferred to it. This easy mode of wearing the hair is strongly recommended by Count Saxe, and by all modern writers on the military art.

2. The *Diet* of soldiers should consist chiefly of vegetables. The nature of their duty, as well as their former habits of life, require it. If every tree on the continent of America produced Jesuit's bark, it would not be sufficient to preserve or to restore the health of soldiers who eat one or two pounds of flesh in a day. Their vegetables should be well cooked. It is of the last consequence that damaged flour should not be used in the camp. It is the seed of many diseases. It is of equal consequence that good flour should not be rendered unwholesome by an error in making it into bread. Perhaps it was the danger to which flour was always exposed of being damaged in a camp, or being rendered unwholesome from the manner of baking it, that led the Roman generals to use wheat instead of flour, for the daily food of their soldiers. Caesar fed his troops with wheat only, in his expedition into Gaul. It was prepared by being husked and well boiled; and was eaten with spoons in the room of bread. If a little sugar or molasses is added to wheat prepared in this manner, it forms not only a wholesome food, but a most agreeable repast.

What shall I say to the custom of drinking spirituous liquors, which prevails so generally in our army? I am aware of the prejudices in favour of it. It requires an arm more powerful than mine; the arm of a Hercules to encounter it. The common apology for the use of rum in our army is, that it is necessary to guard against the effect of heat and cold. But I maintain, that in no case whatever, does rum abate the effects of either of them upon the constitution. On the contrary I believe it always increases them. The temporary elevation of spirits in summer, and the

temporary generation of warmth in winter, produced by rum, always leave the body languid, and more liable to be affected with heat and cold afterwards. Happy would it be for our soldiers, if the evil ended here! The use of rum, by gradually wearing away the powers of the system, lays the foundation of fevers, fluxes, jaundices, and the most of diseases which occur in military hospitals. It is a vulgar error to suppose that the fatigue arising from violent exercise or hard labour is relieved by the use of spirituous liquors. The principles of animal life are the same in a horse as in a man; and horses, we find undergo the severest labour with no other liquor than cool water. There are many instances where even reapers have been forced to acknowledge that plentiful draughts of milk and water have enabled them to go through the fatigues of harvest with more pleasure and fewer inconveniences to their health, then ever they experienced from the use of a mixture of rum and water.

Spirituous liquors were unknown to the armies of ancient Rome. The canteen of every soldier was filled with nothing but vinegar; and it was by frequently drinking a small quantity of this wholesome liquor mixed with water, that the Roman soldiers were enabled to sustain tedious marches through scorching sands, without being subject to sickness of any kind. The vinegar effectually resists that tendency to putrefaction, to which heat and labour dispose the fluids. It moreover calms the inordinate action of the solids, which is created by hard duty. It would be foreign to my purpose, or I might show that the abstraction of rum from our soldiers, would contribute greatly to promote discipline and a faithful discharge of duty among them. General Wolfe, who was a philosopher as well as a general, never suffered a drop of spirits to be drunk by his soldiers, except when they served as sentries or upon fatigue duty in rainy weather. Perhaps these are the only cases in which a small quantity of rum may be useful. It will be of the most essential service if it be mixed with three or four times its quantity of water.

3. Too much cannot be said in favour of *Cleanliness.* If soldiers grew as speedily and spontaneously as blades of grass on the continent of America, the want of cleanliness would reduce them in two or three campaigns to a handful of men. It should extend, 1. To the *body* of a soldier. He should be obliged to wash his hands and face at least once every day, and his whole body two or three times a week, especially in summer. The cold bath was part of the military discipline of the Roman soldiers, and contributed much to preserve their health. 2. It should extend to the *clothes* of a soldier. Frequent changes of linen are indispensably necessary; and unless a strict regard is paid to his articles, all our pains to preserve the health of our soldiers, will be to no purpose, 3. It should extend to the *food* of a soldier. Great care should be taken that the vessels in which he cooks his victuals should be carefully washed after each time of their being used.

Too many soldiers should not be allowed on any pretence whatever to crowd into the same tent or quarter. The gaol fever is the offspring of the perspiration and respiration of human bodies brought into a compass too narrow to be diluted, and rendered inert by a mixture with the atmosphere.

It has been remarked that the men are most healthy when the exigencies of a campaign have made it necessary for an army to send off their tents. This must be occasioned by the tents being rendered unhealthy from being too much crowded, or from not being kept clean.

The straw or hay which composes the bed of a soldier, should be often changed, and his blanket should be exposed every day to the sun. this will prevent the perspiration from becoming morbid and dangerous by accumulating upon it.

The commanding officer should take the utmost care never to suffer a soldier to sleep, or even to sit down in his tent with wet clothes, nor to lie down in a wet blanket or upon damp straw. The utmost vigilance will be necessary to guard against this fruitful source of diseases among soldiers.

The environs of each tent, and of the camp in general, should be kept perfectly clear of the offals of animals and of filth of all kinds. They should be buried or carefully removed every day beyond the neighbourhood of the camp.

4. The formation of an *Encampment* is of the utmost importance to the health of an army. It is to no purpose to seek for security from an enemy in the wisest disposition of troops in a country where marshes and mill-ponds let loose intermitting fevers upon them. Sometimes it may be necessary to encamp an army upon the side of a river. Previously to this step, it is the duty of the quarter master to inquire from what quarter the winds come at the season of his encampment. If they pass across the river before they reach his army, they will probably bring with them the seeds of bilious and intermitting fevers, and this will more especially be the case in the fall of the year. The British troops at Pensacola, by shifting their quarters every year, so as to avoid the winds that come over a river in the neighbourhood of the town, at a certain season, have preserved their health in a manner scarcely so be paralelled in so warm a climate.

Frequently changing the spot of an encampment has been found to contribute greatly to the health of an army. It effectually guards the men against the effects of those offal matters which are so small, or so concealed, as to elude the vigilance of an officer.

It is the duty of the commanding officer, of a division or detachment of the army, to avoid as much as possible, exposing his troops to *unnecessary* fatigue, or watchfulness. The daily exercises of the manual, and manoeuvres, (which contribute to the health of soldiers) as also all marches, should be performed in the cool of the morning and evening in summer. Sentries should always be provided with watchcoats; and they should be *often* relieved in very hot, cold, and rainy weather.

It is a good custom for a sentry always to eat a hearty meal before he enters upon duty in cold weather. The gentle fever excited by his food contributes to guard him in a degree against the effects of the cold.

5. Idleness is the bane of a soldier. It exposes him to temptations not only to every kind of military vice, but to every species of military disorder. But his exercise should be *regular*, and performed at *stated* periods; nor should it be suspended during his recess from the toils of war in his winter quarters. "We remark (says Montesquieu in his excellent treatise on the rise and fall of the Roman greatness) in modern times, that our soldiers perish from *immoderate* fatigue, notwithstanding it was by immense labour the Romans preserved their armies. The reason I believe was, their labour was *constant*, whereas among us our soldiers pass from the extremes of labour to the extremes of idleness, than which nothing can be more destructive to the lives of men."

The fire and smoke of wood, as also the burning of sulphur, and the explosion of gunpowder, have a singular efficacy in preserving and restoring the purity of the air. There was an instance in the last war between Britain and France, of a ship in sir Edward Hawke's fleet, that had above a hundred men on board ill with a low fever. This ship was obliged to bear her part in the well known battle between sir Edward and Monsieur Conflans. A few days after the engagement, every man on board this ship recovered, and an entire stop was put to the progress of the disease. This extraordinary event was thought to be occasioned by the explosion and effluvia of the gunpowder.

I shall conclude these directions by suggesting a few hints which appear to be worthy of the attention of the gentlemen of the army.

Consider in the first place, that the principle study of an officer, in the time of war, should be to save the blood of his men. An heroic exploit is admired most when it has been performed with the loss of a few lives. But if it be meritorious to save the lives of soldiers by skill and attention in the field, why should it be thought less so to preserve them by skill and attention of another kind in a march, or an encampment? And on the contrary, if it be criminal in an officer to sacrifice the lives of thousands by his temerity in a battle, why should it be thought less so to sacrifice twice their number in a hospital, by his negligence?

Consider in the second place, that an attention to the health of your soldiers is absolutely necessary to form a *great* military character. Had it not been for this eminent quality, Xenophon would never have led ten thousand Greeks for sixteen months through a cold and most inhospitable country ; nor would Fabius have kept that army together, without it, which conquered Hannibal, and delivered Rome.

Consider thirdly, that the discipline necessary to make an army victorious, requires that the principle of self-preservation should in some measure be suspended in a soldier. If he be taught that it is a crime to have a single thought about his life in the field, he will soon transfer the same indifference about his life to the camp, or to his quarters. It argues therefore a want of understanding in an officer to charge his men with carelessness of their health and lives. Julius Caesar wanted nothing but strength in a man to make him a soldier, fie supplied every other want from his own great fund of military qualities. Nature has given the Americans strength; and the cause of liberty has given them principle above the common soldiers of any other army upon the face of the earth. The blame, therefore, will only be yours, if they are not made superior to them in all the arts which improve and adorn a soldier's person and character.

Lastly. Consider that your country and posterity look up to you for the preservation of the only means of establishing the liberties of America. The wisdom and eloquence of writers and orators have long since yielded to the more powerful oratory of our sword. All our hopes, therefore, are in our army. But if any thing can be added to these motives, consider further, that there is scarcely a soldier under your command who has not a mother, a wife, a sister, or a child. These helpless members of society made great sacrifices to their country when they urged the beloved objects of their affection to follow the recruiting drum to the camp. Whenever, therefore, your duty requires that you should attend to the health of your men, imagine you see one or perhaps all of their female and helpless connexions standing at the door of your tents or quarters, and beseeching you by the remembrance of the pleasures you have enjoyed, and by the prospect of the pleasures you expect, in those connexions, to repair immediately to the tents or huts of your men, and to attend to every thing which reason and conscience tell you are necessary for the preservation of their health and lives.

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Chapter XVIII

Necessary Regulations for preserving Order and Cleanliness in the Camp

When a regiment enters a camp, the field officer must take care that the encampment is pitched regularly; that the sinks [latrines] and kitchens are immediately dug in their proper places, and that no tents are pitched in any part of the camp contrary to the order prescribed…

One officer of a company must every day visit the tents; see that they are kept clean; that every utensil belonging to them is in proper order; and that no bones or other filth be in or near them; and when the weather is fine should order them to be struck about two hours at noon, and the straw and bedding well aired.

The soldiers should not be permitted to eat in their tents, except in bad weather; and an officer of a company must often visit the messes; see that the provision is good and well cooked; that the men of one tent mess together; and that the provision is not sold or disposed of for liquor…

The officer of the police is to make a general inspection into the cleanliness of the camp, not suffer fire to be made any where but in the kitchen, and cause all dirt to be immediately removed, and either burnt or buried...

The place where the cattle are killed must be at least fifty paces in the rear of the wagons; and the entrails and other filth immediately buried; for which the commissaries are to be answerable...

The quarter-master general must take care that all dead animals, and every other nuisance in the environs of the camp, be removed...

Chapter XXIV

Of the Treatment of the Sick

There is nothing which gives an officer the love of his soldiers more than his care of them under the distress of sickness; it is then he has the power of exerting his humanity in providing them every comfortable necessary, and making their situation as agreeable as possible.

Two or three tents should be set aside in every regiment for the reception of such sick as cannot be sent to the general hospital, or whose cases may not require it. And every company shall be constantly furnished with two sacks to be filled occasionally with straw, and serve as beds for the sick. These sacks to be provided in the same manner as cloathing for the troops, and finally issued by the regimental clothier to the captain of each company, who shall be answerable for the same.

When a soldier dies, or is dismissed the hospital, the straw he lay on is to be burnt, and the bedding well washed and aired before another is permitted to use it.

The serjeants and corporals shall every morning at roll-call give a return of the sick of their respective squads to the first serjeant, who must make out one for the company, and lose no time in delivering it to the surgeon, who will immediately visit them, and order such as he thinks proper to the regimental hospital; such whose cases require their being sent to the general hospital, he is to report immediately to the surgeon general, or principal surgeon attending the army.

Once every week (and oftener when required) the surgeon will deliver the commanding officer of the regiment a return of the sick of the regiment with their disorders, distinguishing those in the regimental hospital from those out of it.

When a soldier is sent to the hospital, the non-commissioned officer of his squad shall deliver up his arms and accoutrements to the commanding officer of the company that they may be deposited in the regimental arm chest.

When a soldier has been sick, he must not be put on duty till he has recovered sufficient strength, of which the surgeon should be judge.

The surgeons are to remain with their regiments as well on a march as in camp, that in case of sudden accidents they may be on hand to apply the proper remedies…

Instructions for the Commandant of a Regiment

The state having entrusted him with the care of a regiment, his greatest ambition should be to have it at all times and in every respect as complete as possible: To do which, he should pay great attention to the following objects:

The preservation of the soldiers health should be his first and greatest care; and as that depends in a great measure on their cleanliness and manner of living, he must have a watchful eye over the officers of companies, that they pay the necessary attention to their men in those respects.

Hospitalization in the Revolutionary War

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ABSTRACT

During the American Revolution, there were only two hospitals in the American colonies. The war required the rapid development of a new hospitalization system to care for soldiers who were sick and wounded in the field. Based largely on the British army's hospitalization plan, the Hospital Department developed regimental hospitals, general hospitals, and flying hospitals to care for thousands of soldiers. The hospitals were chronically understaffed, undersupplied, and were squalid. They cared for soldiers with infectious disease, such as the "putrid fevers" of typhus and typhoid fevers. Perhaps the single greatest challenge of the war was caring for the overwhelming smallpox pandemic, until Washington implemented an audacious, first-of-its-kind plan to inoculate the Continental Army. At the end of the war, malaria became a challenge that overwhelmed the British and was a contributing factor to the surrender at Yorktown. Even though disease killed soldiers at a ratio of 2.6 to those who died from combat, the hospitals provided some rudimentary trauma care.

INTRODUCTION

When the Revolutionary War started in April of 1775, there were only two organized hospitals in the colonies, located in New York and Philadelphia. Healthcare was primitive, as the Germ Theory, which stated that microorganisms are the primary cause of infectious disease, was 80 years in the future. Physicians believed that the causes of disease required expulsion via bleeding, inducing vomiting, sweating, diarrhea, or other purges, and treatment often worsened the patient's condition.[1] The colonists avoided hospitals if possible.

EIGHTEENTH CENTURY HOSPITALIZATION IN THE AMERICAN COLONIES

When war broke out in 1776, hospitalization in the colonies was rudimentary. The predecessors of hospitals were almshouses, whose primary function was to provide housing to those in need. Since many of their inhabitants were children and older adults, the almshouses evolved to provide a staffed space to care for those residents who were ill. Some of the colonies' almshouses became the United States' first hospitals. The Pennsylvania Hospital was established by Dr. Thomas Bond in 1751 and was followed by New York Hospital, which was newly constructed at the time of the revolution.

The current paradigm for hospitalization did not exist in 18th Century America. The two hospitals were associated with poor urban populations who had no one to care for them or no place where they could be cared for. People were cared for in their own homes, indeed in their own beds by family members and a visiting physician. Because they only cared for the destitute, the two hospitals were not even a consideration for the middle- and upper-class colonists of Philadelphia and New York.

Care for the ill was rarely provided by individuals who were formally trained. In 1775, there were an estimated 3,000 physicians in the Colonies, less than 10% of whom had either attended a medical college or had received training. There were two medical schools - Philadelphia Medical College founded in 1765 and Kings College Medical College in New York in 1767. Some physicians learned their trade in a few years of on-the-job training. Nursing was yet to become a profession. Nurses' responsibilities included basic tasks such as food preparation, housekeeping, and some rudimentary care. Nursing was largely provided by women seeking employment or religious orders. There were no allied health professions or pharmacists, although apothecaries performed some healthcare roles in the absence of other providers.

CONCEPTUALIZATION OF AN EIGHTEENTH-CENTURY FIELD HOSPITAL

The army realized that fielding an force engaged in combat required field hospitalization. In 1776, Dr. John Morgan, Director General of the Hospital of the Army, developed a plan for hospitals that would be "floored above, so as to make two stories each, and to have a stack of chimneys carried up the middle …It is further required that bed bunks be made and straw be always in readiness.."[5] In reality, the hospitals tended to occupy civilian buildings such as large homes, community centers, university buildings, and churches. They occasionally used tents. In the latter parts of the war, hut-like hospital buildings were designed and built specifically for the purpose.

The hospitals needed supplies that consisted of linens, clothing, bedding; equipment such as the utensils for cooking and serving food; and medical equipment such as surgical sets, bedpans, and scales. A carpenter would be employed to build the beds and other necessary items.

A hospital's medication needs reflected the 18th Century's philosophy of disease. Most 18th Century clinicians believed in the Humoral Theory, which stated that imbalances of four bodily fluids – blood, phlegm, yellow bile and black bile – were responsible for disease. By ridding the body of excesses of these substances, homeostasis could be restored. The expulsion of the humors required cathartic medications such as bark (cinchona bark, which contains quinine), ipecac, camphor, and calomel. They could also be expulsed by bleeding the patient. Few 18th Century medications are still in use today, although opium (when available) was a frequent and effective treatment for pain.

DEVELOPMENT OF A FIELD MEDICAL SYSTEM

The newly organized Continental Army required the rapid development of a field medical system. The Hospital Department was created in 1775 to manage hospitalization in the field, with Dr. Benjamin Church as its inaugural director. As many of the senior officers had served with the British in the French and Indian War, hospitalization was based on the British model. Hospitalization existed at three levels: A regimental hospital, which was embedded with each regiment; general hospitals, intended to be better resourced and a referral destination from regimental hospitals; and "flying hospitals", which were able to hastily move and operate proximal to large concentrations of troops.

A Continental regiment had a full complement of around 700 soldiers. Each regiment had a surgeon and two surgeons' mates. Because regimental hospitals operated independently, the Hospital Department could not prevent them from employing the lower quality, more poorly educated physicians. Since regimental hospitals were organic to the units, they traveled with and were adjacent to the regiments they served.[1]

General hospitals were thought to be of higher quality, more efficient, and more cost-effective. General hospitals were larger and were fixed in their location. Their physicians were hired by the Hospital Department, had met rigorous accession standards, and were considered by Department leadership to be more highly skilled than their regimental hospital peers.

Flying hospitals were a distant precursor to the modern mobile hospital. They were intended to be light, small, and have minimal personnel allowing it to easily follow the combat units. Staffing consisted of a director who could also serve as a surgeon, four surgeon's mates, and a few nurses. Like regimental hospitals, they operated independently of the Hospital Department. The initial intent was for one flying hospital per army. However, Gillett states that the definition of flying hospital in the Continental Army evolved over time and becomes a "large and more formal version of the regimental hospital."[1] Although the flying hospital was meant to occupy a tent or a small building, Washington issued a general order at Valley Forge which prioritized the construction of a hut-based flying hospital that was well ventilated, heated, and located 100 to 300 yards away from the brigades.

FIELD HOSPITALIZATION IN PRACTICE

The intent was for regimental hospitals to evacuate their patients to general hospitals if the patient was proving difficult to care for or the regimental hospital had to prepare to move. The sick and wounded soldiers, however, preferred and sometimes demanded to stay with their regiment. The regimental surgeon was often from the same town or area as the soldiers in the regiment. The regimental hospital concept kept soldiers co-located with their units. Additionally, patients might have associated general hospitals with the poor care and social stigma that almshouses and the first hospitals were known for. The regimental hospital might also have been associated more closely with the colonies' preferred model of homecare, as moving to a general hospital might not improve a patient's condition and would remove him from a known environment.

Patient movement was difficult as there was no patient evacuation plan and poor record keeping. Evacuation was done by horse-drawn wagon, and transportation was often in short supply. The evacuation problems were likely compounded by the fact that the Hospital Department lacked command and control over regimental hospitals.[1,11] At one point in 1778, Washington issued general orders which placed regimental hospitals under the control the Chief Surgeon of that unit's flying hospital. The "death of several men" had resulted from patients being inappropriately assigned to hospitals that were overcrowded or undersupplied.

Almost without exception, the hospitals were an awful place to be. The patients often were crammed into dark, damp quarters. At times, "hordes" of patients would who were sick, unclothed, emaciated and "vermin-ridden" would descend on small communities. At one point the Brethrens' House (a large community building in a Moravian colony in Bethlehem, Pennsylvania) was commandeered for use as a hospital; 360 patients were afforded only four square feet of space each. Dr. James Thatcher, a physician with the Continental Army on the Canadian Expedition wrote on June 7th, 1776, "Visited many of the sick in the hospital. Was

moved with a compassionate feeling for the poor, distressed soldiers, who, when they are sick are thrown into this dirty, stinking place and left to take care of themselves."[14]

Colonel William Smallwood, who commanded the 1st Maryland Regiment, wrote in 1776, "The men being often moved, and have been to exposed to lie on the cold ground ever since they came here; often lying without their tents for several nights."[14] The squalid conditions were questioned by some physicians who, despite a lack of knowledge of modern disease theory, found a lack of cleanliness to be problematic. Some felt the sick would fare better being in an environment open to fresh air and that clean soldiers would be healthier.

The acquisition of medications was a problem throughout the war in the absence of adequate congressional funding and a poorly functioning medical logistical system. Available medicines were stockpiled by the Hospital Department at the general hospitals. Requests for supplies and medicines made by the regimental hospitals were often denied by the general hospitals, increasing the tension within the hospitalization system. A letter written on November 7th, 1776, by Maryland regimental surgeon James Pine recounted his experience of trying to obtain supplies from a general hospital: "...I waited on Doctor Morgan, Director-General of the hospitals here, for medicines, etc. He told me he had nothing to say to the Maryland troops and that it was not his business to supply the regimental surgeons with medicines..." Many patients ironically benefitted from medication scarcity given that most of the medications administered at the hospitals did not help or even worsened the patient's condition.

Staff were in short supply as well. Nurses served in both the regimental and general hospitals. Nurses at the time were not formally trained. Sometimes, they consisted of volunteer nuns or members of religious orders such as the Moravians. Ideally, each hospital employed a supervisory "matron" who had managerial responsibility of the nurses and ensured that the food was prepared, that wards were kept clean and in order, and that utensils were neat and clean. Nurses staffed each ward, ideally at a ratio of 10 patients to each nurse, and were responsible for administering medications and washing and feeding soldiers. Nurses were paid $2 per month. Their pay had been reduced at one point from $4 a month, making staffing hospitals even more difficult. There were many attempts to recruit nurses within the colonies, but units often had to be tasked with providing labor to serve as nurses and almost always provided their poorly performing soldiers.[11]

When the army was in the field, they were often trailed by a group of civilians referred to as "camp followers." The camp followers were primarily the wives and children of the soldiers. Many of the women served as nurses for the hospitals because the pay and additional rations allowed them to provide for their families. Although they provided essential services of cooking and cleaning, the camp followers were viewed primarily as a burden, as they required food and supplies and often became patients in the hospitals themselves. It was preferred that women stay home, care for the family, and tend to the farms and small businesses.

PATIENT CARE

Most of the patients in the hospitals were suffering from infectious diseases. It was not uncommon during the war for one-quarter of the army to be ill and infirm at any moment. Cirillo refers to the period prior to World War II as the "Disease Era", defined as the period where disease killed more soldiers than combat. In the Revolutionary War, disease killed an estimated 2.6 soldiers for each who died in combat. Since the Korean War, the ratio has been a constant 1:50, with only one soldier dying from disease for every 50 dying from combat. An estimated 25% of patients admitted to a hospital died, prompting Dr. Benjamin Rush to state in 1786, "Hospitals are the sinks of human life in the army. They robbed the United States of more citizens than the sword."

"Putrid Fevers"

Typhus and typhoid fever constituted what was known as the "putrid fevers." Typhus is a rickettsial disease that is transmitted by bacteria from the bite of lice, causing fever, headaches, rash, and confusion. Typhus is now prevented in humans through louse removal and is treated with doxycycline. Typhus was passed from patient to patient in the Continental hospitals through infected bedding that was not sufficiently cleaned between patients. Dr. Benjamin Rush wrote of typhus in 1794, "there were many instances of patients with slight sicknesses who fell dead after being removed from a hospital."[13] Typhus patients were treated by bleeding, blistering, and purging. Some patients were given bark mixed with wine, salt and mercury.[10]

The other putrid fever was typhoid fever. Caused by the bacteria *Salmonella typhi* in an infected water supply, the associated illness consists of fevers, chills, abdominal pain, and diarrhea. In some patients, the illness eventually results in septic shock and death. Today, typhoid fever can be experienced by those who travel to endemic areas, is diagnosed with blood and stool cultures, and is treated with antibiotics.

The conditions in the hospitals no doubt contributed to spread of the putrid fevers. The hospitals that were overcrowded and poorly outfitted with proper bedding and clothing were particularly susceptible to the presence of infectious disease. Unfortunately, the staff also frequently contracted the diseases as well. Rush wrote to Washington in 1778, "That so violent was the putrid fever in the hospital, that nine out of 11 surgeons were seized with it one of whom died, that out of three stewards two died with it and the third narrowly escaped with his life, and that many of the inhabitants of the village caught & died with the said putrid fever."

Smallpox

While the putrid fevers were often acquired because of hospitalization, it was naturally occurring smallpox that arguably had the largest impact on Continental Army readiness. Smallpox is caused by the variola virus. A particularly destructive disease that was responsible for deaths of millions worldwide, smallpox has been eradicated since 1977 through an effective global vaccination program. For those who were infected with the severe variola major form of the disease, mortality rates ranged from 30 to 50 percent.

Smallpox was arguably the single largest healthcare challenge of the war. John Adams wrote that smallpox was, "ten times more terrible than the Britons, Canadians, and Indians together."[1] In 1776 when Boston was occupied, there were rumors that the British were expelling the ill patients into the community as an early attempt to engage in biological warfare. Entire hospitals had to be established for nothing but smallpox patients. Soldiers afflicted with smallpox would be quarantined in a smallpox isolation hospital that was guarded by men who had previously contracted the disease.

Smallpox was primarily transmitted through respiratory secretions spread by coughing and sneezing. Smallpox resulted in high fevers, headaches, and backaches which would be followed by characteristic lesions in the mucous membranes and on the skin. The lesions were numerous and fluid-and pus-filled.[22] If the patient survived, the skin lesions would heal in a few weeks and would leave scars. George Washington contracted smallpox while in Barbados in 1751 and was scarred on his nose. Washington - like all patients who survived smallpox - developed natural, lifelong immunity.

It is thought that smallpox was particularly problematic for the colonists because many lived in rural, agrarian communities that were isolated and were therefore never exposed. The British, however, with more towns and cities, were often exposed to smallpox as children, developed immunity, and the disease was significantly less of a burden.[23]

Hospitalizing smallpox patients was, arguably, the primary function of the Hospital Department in the first half of the war until widespread inoculation.Dr. Isaac Rand operated several smallpox hospitals, the first as early as in 1776.[1] At times, caring for smallpox patients was overwhelming, particularly during the Canadian campaign. On May 26, 1776, Dr. Lewis Beebe wrote, "If ever I had a compassionate feeling for my fellow creatures who were objects of distress, I think it was this day; to see large barns filled with me in the very height of the smallpox and not the least thing to make them comfortable was almost sufficient to excite the pity of brutes."[14] On June 26, 1776, he wrote, "The regiment is in a most deplorable situation, between 4 and 500 now in the height of the smallpox. Death is now become a daily visitant in the camps, but as little regarded as singing of birds."[14]

Treating smallpox was based on the severity of the symptoms. Dr. William Buchanan wrote the book *Domestic Medicine* in 1785. Recommendations for fevers included bleeding the patient. The patients were kept cool by getting them out of bed in light clothing. If a patient's kidneys stopped producing urine, taking them out of bed and walking them in bare feet was claimed to be effective. It was considered a poor prognostic indicator if a patient developed a "secondary fever", requiring immediate bleeding and surgical opening of the pustules.

A person who had never been exposed to smallpox could become immune through a somewhat common yet controversial practice of inoculation. Inoculation is different than vaccination. An individual would become inoculated by having a sample of pus taken from an actively ill patient that was introduced by way of a puncture. Hopefully, would acquire a much milder form of the disease, could be put in isolation, and would recover and become immune. Smallpox inoculation killed about .1% of those undergoing the procedure. At one point, it was believed that those undergoing inoculation benefitted from being given mercury, bled, and purged.

Initially, there was widespread resistance to inoculation. Some of the colonists had a religious opposition, believing that it actively avoided God's will. If one was meant to endure smallpox, it might be God punishing them for their sins. Others were concerned that the inoculated soldiers could spread the disease to their town's populace. In 1778, the town of Springfield, Massachusetts forbade the Army from a mass inoculation program because the town was concerned that the inoculated soldiers could spread the disease to their populace, despite an aggressive quarantine plan. At one point, a physician in Massachusetts was jailed for inoculating soldiers.[24]

In the winter of 1777, when Washington had been become convinced that he had no choice but to institute a mass inoculation program, less than 1% died from inoculation. Arguably the first widescale inoculation program in the United States, the initiative was so successful that it would be repeated in 1778.[1,23,24]

Malaria

At the end of the war, malaria became problematic, particularly for the British. Malaria was endemic in the southern portion of the United States at the time and many soldiers from more Southern colonies had developed immunity to the disease in their youth. Malaria is a caused by the *Plasmodium* species of parasite. It is transmitted by the female *Anopheles* mosquito and is found in tropical areas. It remains a devastating disease worldwide, causes an estimated 249 million cases and 608,000 deaths per year. Symptoms of malaria include chills, fever, malaise, headaches, nausea, and vomiting. Malaria is diagnosed using blood tests and is treated

with medications such as chloroquine. Travelers can prevent infection with prophylactic medications such as mefloquine and doxycycline.

Having no possible way of understanding the pathophysiology of malaria or reliable method of diagnosis, physicians at the time simply classified it as an "intermitting fever." Buchanan wrote: "intermitting fevers, under proper regimen, will often go off without medicine; and when the disease is mild, in an open dry country, there is seldom any danger from allowing it to take its course; but when the patient's strength seems to decline, or the paroxysms are so violent that his life is in danger, medicine ought immediately to be administered."[25] 18th Century physicians treated intermitting fevers with quinine-containing bark from the Cinchona tree, which was known as Peruvian or Jesuit bark. Like other medications, the bark was difficult to obtain.

During the siege of Yorktown, Washington himself was actively involved with finding hospital beds for malaria patients in the area around Williamsburg. In 1780, the British army was so overwhelmed with malaria that half of the army was unable to maneuver while facing combined American and French forces and was an important factor in Cornwallis' surrender.[1,29]

Trauma

While hospitalization was predominantly oriented towards infectious disease, it also included trauma care. Of the estimated 25,000 Continental Army soldiers who died in the war, it was thought that about one-quarter of them died from wounds sustained in battle. Most of the wounds acquired during combat were due to hand-to-hand fighting. The wounds experienced included penetrating injuries from knives and swords; and from "caltrops", which were iron barbs that soldiers stepped on. The muskets, pistols and rifles of the time were nor particularly accurate and there were not as many gunshot wounds.[1,10,30]

Soldiers who suffered an extremity wound would frequently have the limb amputated, a surgical procedure with an estimated 65% mortality rate. Amputations were done without anesthesia and could be completed in as little as 30 seconds by a skilled surgeon. After the limb was removed, the vessels were ligated by tying them with wound linen. Dressings were created from lint, which soldiers found to be comfortable, and were capable of some absorption. Patients suffering from wounds were often given laxatives, medications intended to induce sweating, and were bled.[1,10,30,]

CONCLUSION

The Revolutionary War called for the rapid development of a hospitalization system to care for the thousands of sick and wounded. The effectiveness of hospitalization was limited by a poor understanding of disease and treatment, poor supplies, and poor sanitation. The squalid conditions in the hospitals resulted in them becoming reservoirs for "putrid fevers" such as typhus and typhoid fever. Despite the challenges, the hospitals cared for large numbers of patients suffering from infectious disease and battlefield trauma.

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"Shocking to Humanity": The Medical History of the Southern Campaign of the American Revolution, 1780-1783

H. Allen Skinner, PhD

INTRODUCTION

This article will analyze the military medical systems in the southern theater of operation from 1780 to the war's end. What sets this article apart from earlier history works, like Lt. Col. Louis C. Duncan's *Medical Men in the American Revolution* and Mary C. Gillett's *The Army Medical Department 1775-1783*, are details derived from the *Papers of Nathanael Greene* published by the University of North Carolina Press. Major General Greene took command of the Southern Department in late 1780 after catastrophic American defeats at Charleston and Camden. By the end of 1781, Greene's army of Continentals and militia "…had reconquered all of the South except Savannah and Charleston. Greene's operations rank with Washington's performance at Trenton and Princeton as the war's most brilliant campaigns." Greene was also a prolific writer; thus, his *Papers* are a rich and heretofore untapped source of information concerning medical operations in the southern theater of the American Revolution.[1-3]

THE SOUTHERN DEPARTMENT 1775-1778

The American Revolution began as a localized rebellion and quickly morphed into a defensive attritional war. While the Continental Army and its Patriot militia supporters fought to survive, American diplomats sought intervention from Britain's traditional enemies, France and Spain. [4-6]

Major fighting between 1775 to early 1778 took place mainly in the northern states. The British made one serious effort against Charleston, South Carolina, in 1776, but the effort failed due to inept cooperation between Sir Henry Clinton and his Royal Navy counterpart, Sir Peter Parker––and a stout American defense of Sullivan's Island on 28 June 1776. [7-8]

The British incurred ninety-one killed and 170 wounded, while the American defenders of Charleston lost only twelve dead and twenty-five wounded. The Americans were fortunate at the small number of casualties, as there was no established military medical system. John Rutledge, President of South Carolina, belatedly addressed that shortfall by appointing Doctor David Oliphant the Director General of the military hospitals in July 1776. Oliphant was a native Scotsman who completed his medical studies at the University of Edinburgh. Oliphant subsequently fled Scotland in 1747 to avoid British reprisals for supporting the failed Jacobite rising of 1745. He soon set up medical practice in Charleston, South Carolina, and was naturally sympathetic to the revolutionary cause. Oliphant was joined by Dr. Peter Fayssoux, a native Charlestonian who also attended the University of Edinburgh. Fayssoux established his practice in Charleston in 1768 and served initially as Colonel William Moultrie's surgeon during the battle of Sullivan's Island. Fayssoux was subsequently commissioned in 1778 as the senior physician of the South Carolina Continental Line. [9-10]

Oliphant and Fayssoux were among the few school-trained physicians in the southern colonies––a consequence of the lack of medical universities in the region. Instead, most southern doctors instead learned their practice through apprenticeships. For example, the first Continental surgeon appointed by the Continental Congress was Dr. William Rickman of Virginia. Rickman probably gained his physician skills through on-the-job training while a surgeon for the Royal Navy. Rickman served as the surgeon for HMS *Launceston* during 1766 but afterward set up medical practice in Virginia. Congress appointed Rickman as the "Director and Chief Physician of the Hospital in Virginia in the Service of the Continent" in May 1776. He subsequently worked with the Virginia state government to open a military hospital in the Wren Building, on the modern William & Mary University campus in Williamsburg, Virginia. Besides running a general military hospital, Rickman later opened a special ward to inoculate Continental recruits against smallpox as they passed to and from the Southern Department [3,11-12]

The writings of Sir John Pringle's 1753 *Observations on the Diseases of the Army*, and prior operations, taught commanders and military surgeons the dangers of military operations in the American south. Rampant malaria was one of the major problems faced by both armies in the Southern theater. Sir Henry Clinton decided against a second attack on Charleston in June 1776 due to his fears of the "sultry, unhealthy season," and its accompanying agues (fevers)

and dysentery. Knowledge of the dangers of summertime campaigning did not prevent both sides from attempts that usually ended in rampant illness. For example, American troops in Georgia and South Carolina attempted three separate assaults on British East Florida, which failed largely due to widespread malaria and typhoid fevers. British expeditions from St. Augustine in December 1778 captured weakly defended Savannah, Georgia. A subsequent expedition from Savannah into South Carolina by General Augustine Prevost withdrew in June 1779 after many of its officers and soldiers fell ill. [13-14]

In the instance of malaria, the Americans benefited from access to Jesuits' (cinchona) bark from Spanish authorities in New Orleans. Cinchona bark contains quinine, a substance known to suppress malarial symptoms. The importance of the bark is underscored by an entry in the Journals of the Continental Congress for 20 September 1776: "Resolved: That the Medical Committee be directed to forward 300 lb. of Peruvian bark to the southern department, for the use of the troops in said department."[13,15]

THE SOUTHERN DEPARTMENT 1778-1780

General Robert Howe, commander of the Southern Department from 1776 until the loss of Savannah in late 1778, attempted two invasions of Florida. Both failed due to command rivalries, supply shortages, and stiff enemy resistance. Howe's after-action report also noted: "The physician general and all of the surgeons of the army report that at least one-half the number of men we set out with are already sick, many of them dangerously so, and that by the increasing inclemency of the climate, the greater part of the army now well, will either by continuing here or advancing most probably be destroyed." [16]

Howe's replacement, Major General Benjamin Lincoln, set out to retake Augusta, Georgia, in early 1779. The American movement provoked a British foraging raid into South Carolina by Gen. Prevost. A small force under General William Moultrie clashed with the British advanced guard along the Coosawhatchie River on 1 May 1779. Moultrie afterwards sent a flag of truce to General Prevost with an offer to send Dr. Fayssoux and his assistants and a convoy of wagons and medical supplies to retrieve and treat the wounded – an offer that Prevost honored. From Moultrie's description, it appears Fayssoux was in charge of a mobile (flying) hospital. [17]

The morale of the defeated American army was further undermined when retreating militia troops brought smallpox into Charleston "…after it had been kept out of the country near twenty years." Although officers and authorities quickly quarantined the sick, word of the outbreak spread throughout the state. Moultrie later noted, "The small-pox breaking out in Charleston, was a very good pretense for the militia not coming into town: in fact, they dreaded that disorder more than the enemy." [17]

Siege of Charleston 1780

General Benjamin Lincoln was another of Washington's trusted subordinates, yet Lincoln disregarded Washington's strategy of maintaining a Continental army presence in the south. Instead, Lincoln's decision to defend Charleston ended with the loss of 1,800 Continentals, including the irreplaceable field and regimental hospital staff and equipment. The British permitted Dr. David Oliphant and the other American physicians to treat sick and injured prisoners, but the British made no effort to supply bedding, dressings, or medicines. The British paroled and exchanged most of the American doctors and surgeons during 1781. Dr. Oliphant was one of the last paroled, and he voluntarily remained in Charleston to run its general hospital. [2,18-19]

British Pacification and the Battle of Camden

The Continental Congress responded to the loss of Charleston and the Southern Army by dispatching Major General Horatio Gates to assume command in the south. Gates took command of a hungry and ragged Continental force in North Carolina in July 1780. He found the supply situation so bad that he felt compelled to march into South Carolina in a desperate bid to capture the British supply depot at Camden. Meanwhile, Clinton had left South Carolina, leaving Lieutenant General Lord Charles Cornwallis and about 8000 regulars––mostly British but a few Germans as well––and northern Loyalist provincials (wartime enlistees) to secure the province. Cornwallis initially planned to organize the local Loyalist militia to perform interior patrol and security duties during the risky summer months, but the American approach put paid to his plans. Cornwallis instead consolidated his available forces and collided with Gates' advancing army during a nighttime meeting engagement on 16 August 1780. After recoiling to wait for dawn, each side advanced to attack at daybreak, but Gates's militia left wing melted away at the sight of bayonet-wielding regulars. Under Major General Johann de Kalb, the Continental right wing fought valiantly as it was crushed between the advancing British infantry troops and encircling dragoons under Lt. Col. Banastre Tarleton. Gates and the surviving Continentals and militia troops fled the battlefield, leaving behind a mortally wounded de Kalb and 290 wounded and 240 dead Americans, mostly Continentals. The Americans also lost their artillery, hundreds of muskets, and dozens of wagons loaded with supplies and baggage. The British incurred sixty-nine dead, 245 wounded, and eleven missing. [20-23]

There is little information about Gates' medical staff besides information in a letter he wrote to Dr. Rickman on 2 August 1780. Gates criticized Rickman's lack of oversight

for the regimental hospitals, which Gates found poorly run and lacking essential medical supplies. Rickman pleaded ignorance of the state of the regimental hospitals in his reply:

> *"…that I have never been applied to on the Subject before till about ten Days since I received a letter from Major General The Baron de Kalb, directing me to send a Surgeon to take charge of the Hospital with proper stores & c. I wrote Him that I shall comply with His Orders as far as lay in my part by directing a Surgeon to that Post with Medicines that it was impossible for me to send Stores not having any or money to purchase them."*[24]

One American surgeon known to be on the battlefield at Camden was Dr. Hugh Williamson, who was later described as a "educator, physician, legislator, merchant, scientist, scholar, and signer of the U.S. Constitution. Williamson wrote of his experience:

> *After the battle of the 16th of August, as soon as I overtook Genl. [Richard] Caswell, he gave me a flag to return to the Enemies Lines for the relief of our wounded… we labored under many difficulties…The Enemy was disposed to neglect us, and a victory which they greatly overrated did not seem to increase their Humanity. For eight or ten days after the Battle our people suffered under great neglect. After the Bitterest Complaints and most urgent importunity our supplies became more liberal. We were also weak in Medical Help. Our Militia Surgeon disappeared after the Battle…It happened that one of the Continental Surgeons fell into the hands of the Enemy. It may be supposed that with his assistance, tho' he was indefatigable, I found it impossible to get the desired help to 240 men, who Laboured under at Least 700 Wounds. After three weeks were happily reinforced by Dr. Johnson, a senior Surgeon of great Skill & Humanity in the Continental Service…*[29]

Williamson's complaints notwithstanding, Cornwallis did what he could to support the treatment of the sick and wounded Americans at Camden. By contrast to the shortages of surgeons in the American ranks, most British regiments had a surgeon and a surgeon's mate. Few were school-trained, but most had three or more years of practical field experience. However, the number of prisoners overwhelmed the hospital staff and facilities at Camden, which prompted Cornwallis to ship the less seriously sick and wounded (along with the unwounded Continentals) down to Charleston promptly to forestall an outbreak of disease. Those Continental surgeons and mates among the prisoners joined Fayssoux in treating the sick and wounded Continentals, who were housed in ghastly conditions aboard prison hulks in the Charleston harbor. Hundreds of the American prisoners later died because of disease and malnourishment. [3,26]

Greene takes Command

Gates fled to Hillsborough, North Carolina, where he struggled to rebuild his army. With the war in the South hanging by a thread, George Washington selected Major General Nathanael Greene to retrieve the situation. After conferring with Washington and others familiar with matters in the Southern Department in October 1780, Greene outlined his concerns to Samuel Huntington, the President of the Continental Congress:

> *The Commander in Chief, in consequence of an Order of Congress to appoint an Officer to the Command of the Southern Army, has thought proper to confer that honor upon me. Whether I am to consider it a misfortune, or otherwise, will depend upon future events…At present I am wholly unacquainted with the intentions of Congress with respect to the plan and extent of the War they mean to prosecute in the Southern Department, as well as the number and condition of the Troops they mean to employ or the States in which they are to be levied. I am also uninformed how they are to be paid, fed and clothed; and through what channel the Quarter Master generals, Ordnance and Hospital Departments are to be supplied… Money is the Sinews of War and without a Military Chest, it is next to impossible to employ an Army to effect…*[27]

Greene then spent several days in Philadelphia trying to improve the southward flow of replacements and supplies and reviewing reports from the Southern Department. Greene efficiently assessed his manpower and logistics needs from the detailed reports of the Adjutant and Quartermaster. The same was not true for the Medical department, as he lamented: "…I have not been able to collect any Information respecting the Situations of the Hospitals in that Department." [27]

Greene quietly relieved Horatio Gates as commander of the Southern Department on 3 December 1780. Greene was a trusted battlefield commander and learned much about logistics while serving as Washington's Quartermaster General from 1778 to 1780. Thus, one of Greene's first actions was to appoint a new Quartermaster and Commissary General to improve logistics–– while he concentrated on tightening discipline in the ranks and forging relationships with the Whig militia commanders in the department. Greene soon realized his little army was in sorry condition after multiple defeats, and the loss of so many trained Continental soldiers, hundreds of weapons, tons of provisions, and supplies. Greene confidentially wrote to Washington about the poor situation; the state of medical services was particularly concerning due to the loss of the general and regimental hospitals (along with their medical staff, equipment, and supplies) at Charleston and Camden. What remained was a single general hospital at Charlotte, which Greene described to President Samuel Huntington as "shocking to humanity." The general hospital at Charlotte was staffed with volunteer physicians under Dr.

William Read, who were neither trained nor equipped to handle camp diseases and battlefield injuries. The hospital was further handicapped by the lack of basic items such as surgeon's chests, medicines, and dressings. [28-31]

Greene prioritized improving his command's combat readiness before Cornwallis resumed his advance into North Carolina in early 1781. Greene first addressed organizational flaws within the command, especially within the medical department. The Southern Department's medical network was fractured into three independent groups. First was the general hospital at Charleston under Dr. David Oliphant which had passed from control of the governor of South Carolina to the British. The British exchanged Oliphant in November 1780, but he remained in Charleston to run the hospital for American patients. Congress subsequently named Oliphant the deputy director of the Southern Department in March 1781. Secondly, the aforementioned Virginia general hospital was run by "Director and Chief Physician" William Rickman at Williamsburg, Virginia. The third was the medical establishment of North Carolina, directed by the North Carolina militia surgeon general, Dr. Hugh Williamson––which provided medical care for both Continental and state troops. [2,31-33]

Greene conducted his inspections with Dr. James Browne, who had been appointed Chief Physician and Surgeon of the Southern Department by Gen. Gates in late 1780. Browne responded to Greene's inspection by detailing the struggles to rebuild the medical service and overcome chronic shortages:

> *Innumerable are the Difficulties to be contended with in arranging the Hospitals and procuring the necessary Supplies for the sick of this Army. The Magistrates everywhere deny the Quarter Masters their Assistance and Sanction in impressing proper Houses for the Reception and menace those Officers with Suits at Law if they take Houses contrary to the sense of the People, whose Approbation is upon no Occasion to be obtained.*[35]

Browne then asked Greene to help procure or build hospital huts and provide money for hiring matrons and nurses to tend to the sick and wounded soldiers. Browne closed his letter by urging Greene to organize a flying hospital to bridge the gap between the regimental and general hospital. Greene could do little immediately to act on Browne's complaints, other than ordering Browne to consolidate the Charlotte general hospital with the army's sustaining base at Salisbury, North Carolina. [2,11,36-37]

The Battle of Cowpens

Greene's assessment revealed a weak army incapable of seriously contesting Cornwallis' expected springtime offensive into North Carolina. Moreover, Greene could not passively defend Charlotte but had to vigorously contest the British advance to embolden Whig supporters–– without exposing the Continentals to undue risk. Greene addressed his dilemma by splitting his army, reasoning that Cornwallis could not easily attack either force without undue risk to his bases and supply lines. Greene sent Brigadier General Daniel Morgan's Flying Army (dragoons and light infantry with a minimal logistics tail) westwards to threaten the Loyalist stronghold of Ninety-Six. Greene secondly sent Lt. Col. "Light Horse" Harry Lee's legion and Brig. Gen. Francis Marion's Whig militiamen to attack British supply lines below Camden. Greene led the remainder of the army–– including Dr. Browne and the general hospital–– east to the Cheraw Hills region to restore its fighting trim among friendly civilians. [37]

In the interim, Cornwallis' planned offensive into North Carolina was upset by increased partisan attacks and a wave of sickness in the redcoat ranks. Cornwallis moved his main army from Camden northwards to the Waxhaws, hoping cooler weather and clean water would tamp down on the sickness. Malaria and yellow fever instead continued to sicken hundreds of troops and similarly incapacitated many key leaders, delaying Cornwallis' advance to Charlotte into October. Officers stricken with illness included both Lt. Col. Banastre Tarleton and Major George Hanger of the *British Legion*. Tarleton was bedridden through much of September, while Hanger was evacuated as a near-invalid back to Britain. The leaderless *Legion* could not intervene to save a Loyalist militia force under Major Patrick Ferguson from destruction by Patriot backcountry militiamen at Kings Mountain on 7 October 1780––a major defeat that permanently hindered Loyalist recruiting for the rest of the war. Cornwallis was bedridden with fever when he learned of the disaster, and he soon ordered the suspension of the fall offensive. The British army fell back to Winnsborough, South Carolina, where cooler weather partially relieved the severity of the ague. Even in November, the monthly return reflected 1,968 fit, 684 sick, 125 injured, and 115 dead –– unsustainable casualty rates if not checked. [14,26]

Greene cautioned Morgan to remain vigilant while attacking the British sources of supply: "If moving as far as Ninety-Six, or any where in the neighborhood of it, will contribute to the obtaining of more ample supplies, you have my consent. Col. Tarleton is said to be on his way to pay you a visit. I doubt not but he will have a decent reception and a proper dismission." Greene certainly expected a pursuit by Tarleton and other Loyalist light troops. Cornwallis, however, opted to send Tarleton's *British Legion* to drive Morgan's corps against Cornwallis' northward advancing army. [31,38-40]

Morgan initially attempted to run northwards to Patriot-friendly territory north of the Broad River. After receiving intelligence that Tarleton's fast-moving troops were closer than expected, Morgan regrouped with available militia reinforcements at the Cowpens, a well-known pasturing ground. On the morning of 17 January 1781, Morgan

inflicted a crushing defeat by encircling or killing most of the enemy's superb light infantry. Tarleton fled with about 200 dragoons, leaving behind 100 dead, 200 wounded, and 600 unwounded troops as prisoners. In return, Morgan lost ten killed and fifty-five wounded Continentals, plus an unknown number of militia casualties.[31,37,39]

The carnage overwhelmed the few available surgeons on both sides. Tarleton sent forward a certain Doctor Stewart and his surgeon's mate––who had presumably remained off the battlefield with the supply trains–– under a white flag of truce to care for the wounded British and Loyalist troops. On the American side, Morgan had the services of Dr. Richard Pindell, the surgeon of the 1st Maryland Regiment. Pindell was born in Hagerstown, Maryland, in 1755 and joined the 1st Maryland, commanded by Col. Otho Holland Williams, in 1777. Pindell saw considerable action with the 1st Maryland in New Jersey and Pennsylvania––where he took command of a detachment of Continentals at Brandywine–– before the regiment marched southwards in early 1780. Instead of staying with the regimental hospital that would typically march separately with the wagon trains, Pindell remained on the battlefield where he "rallied a large Body of the Militia and returned them to the Charge." Pindell subsequently worked with Stewart in supervising details of militiamen in collecting and treating the wounded. Continental dragoon Sergeant Lawrence Everhart later described the story of his wounding and medical treatment:

> *From Rugeley's [Mill] we marched to Ninety-Six & joined Morgan…. From the Pacolet River we moved to Cowpens…Here we were day & night reconnoitering, until the memorable 17th of January…Petitioner's horse being shot he was captured early in the morning by quarter master Wade…& by him taken to Col. Tarleton… [After interrogation by Tarleton] …My wounds were bleeding at the time but soon afterwords were dressed by the surgeon & I received from the enemy great kindness. After the battle, Col. Washington sent two dragoons with me about three miles from the ground to take care of me: Dr. Pindell formerly of Hagers Town Maryland surgeon of our corps dressed my wounds –– remained here until the latter part of February…*[41]

As later described by Sergeant Everhart, the wounded were taken to nearby homes, including that of Dr. Robert Nelson, a Whig surgeon who cared for the non-ambulatory wounded.[39,42-43]

Hare and Hounds with Cornwallis

While the surgeons treated the wounded, details of local Patriot militiamen buried the dead in shallow graves. Morgan's army, accompanied by the ambulatory wounded –– both Whig and Tory–– marched rapidly northwards. Morgan's force crossed the Catawba River north of Charlotte to await reinforcements from Cheraw Hill, while the British prisoners were marched northwards to prisoner of war camps in Virginia. Instead of blindly sending reinforcements, Greene characteristically rode to the critical point to decide how to exploit the opportunity created by Morgan's surprise victory. Despite the heavy losses of light infantry at the Cowpens, Cornwallis's corps was still strong enough to defeat the dispersed American army in detail and capture the American logistics base and general hospital at Salisbury, forty miles northeast of the river. Greene ordered Morgan to contest the British crossing of the Catawba River, buying time to evacuate the Salisbury depot to Virginia, covered by the Continental force marching up from Cheraw Hill. Greene characteristically saw strategic possibilities even amid a risky withdrawal: "It is necessary we should take every possible precaution to guard against misfortune. But I am not without hopes of ruining Lord Cornwallis if he persists in his mad scheme of pushing through the Country and it is my earnest desire to form a junction as soon as possible for this purpose."[39,47]

In the interim, Cornwallis collected up Tarleton's surviving troops and marched in pursuit of Morgan, but his progress was delayed by bad weather and intelligence. Cornwallis paused to await the fall of the flooded Catawba, and to have his troops destroy their "…superfluous baggage and all my wagons, except those loaded with hospital stores, salt and ammunition, and four reserved empty in readiness for sick and wounded." In doing so, Cornwallis expected to improve the mobility of his army. The decision, however, forced his regimental surgeons to either expose their injured and sick to the elements in a jolting, dirty wagon or leave the casualties in the care of local civilians.[31,45]

The British army forced a crossing of the Catawba on 1 February 1781 at the cost of forty-two British and forty American casualties. Cornwallis regrouped and sent Tarleton's *Legion* in pursuit. Still, Morgan's delaying defense bought Greene's quartermasters and surgeons time to safely move the Salisbury depot and general hospital across the Yadkin River on 3 February. Morgan's rear guard swept the area clean of boats before crossing, forcing the British to wait until 7 February to ford the swollen river. At that point, the American army was twenty-five miles away at Guilford Courthouse, where a council of war reaffirmed Greene's determination to avoid fighting until he could safely reconstitute his army in Virginia. Greene lost the services of Morgan, who was invalided home due to debilitating rheumatism and piles. Colonel Otho Holland Williams took command of the "flying army" of light troops screening the withdrawal of the hospital and supply trains towards the Dan River on 10 February 1781. Even as he organized the retrograde, Greene mused:

> *How is it possible an army circumstanced as ours is, can make head against one organized and equipped as Lord Cornwallis's is...It is not improbable from Lord*

> *Cornwallis's pushing disposition, and the contempt he has for our Army, we may precipitate him into some capital misfortune…If Lord Cornwallis knows his true interest he will pursue our army. If he can disperse that, he completes the reduction of the State; and without that he will do nothing to effect.* [31]

Cornwallis' pursuit of Greene took both armies through the villages of Wachovia and Bethabara, communities of pacifistic Quakers and Moravians. Both sects had settled in North Carolina under a land grant guaranteeing their exemption from military service. The practice of exemption continued after the Whig seizure of political control in 1776, except for the requirement to provide financial and material support to the Americans. The Quakers and Moravians had managed to avoid direct involvement in the war until Cornwallis' hungry troops marched into their villages––and confiscated hundreds of pounds worth of provisions and forage and burnt their fences for firewood. [49]

While the American supply and hospital wagons marched towards the lower Dan River, Williams' light troops marched northwards to divert Cornwallis' attention. Williams' diversion succeeded, allowing the logistics trains to cross into Virginia by prepositioned bateaux (flat boats) on 14 February 1781–– followed closely by Williams' triumphant light troops. Cornwallis abandoned his pursuit and marched to gather in Loyalist recruits and provisions near Hillsborough, North Carolina. After quickly taking in fresh supplies, mounted troops, and light infantry, Greene recrossed his combat troops into North Carolina to hinder British consolidation efforts. Greene's army was apparently accompanied only by the regimental hospitals, as Doctor Brown and the general hospital remained safely behind the Dan River barrier, at the Pittsylvania County farmstead of Colonel Peter Perkins. [50]

The Battle of Guilford Courthouse

Greene's reentry into North Carolina brought the British recruitment and resupply efforts to a standstill amid a series of skirmishes. By early March, Cornwallis was desperate for a decision and marched to attack Greene's army at Guilford Courthouse on 15 March 1781. Cornwallis safeguarded his supply and hospital echelon by sending them to safety at Bell's Mill, a Patriot-owned grist mill and farm about twenty-one miles from the expected battlefield. [31, 51-52]

Greene chose to offer battle at Guilford Courthouse, which offered commanding terrain suitable for deploying two lines of militia troops and a final line of Continental infantry and artillery. Greene did not record his exact battle plan, but his dispositions indicate he planned a delaying defense, like Morgan's at the Cowpens, which would attrit the British troops while minimizing risk to his Continental brigades. Greene mirrored Cornwallis' concern for the logistics trains and regimental hospitals by sending them to safely camp at Speedwell Ironworks, about fourteen miles from Guilford Courthouse. [73]

The battle opened with a running two-hour skirmish between the light troops of Lee's Legion and Tarleton's *British Legion* near the New Garden meeting house. Casualties on both sides were fewer than fifty killed and wounded, but the American delaying action gave Greene time to feed his men breakfast before they took up their fighting positions. [46]

The British line lurched towards a line of North Carolina militiamen behind a wood fence around noon on 15 March 1781. Cornwallis's first line shrugged off two volleys and broke the North Carolinian line with a bayonet charge. The militia scattered to safety only after dropping dozens of enemy troops in their tracks. The second line of better-trained and led Virginia state troops fought longer, with platoons and companies continuing a fighting withdrawal even after a British bayonet charge broke their line. The cumulative efforts of the two militia lines dangerously fragmented Cornwallis' army, and the Continental line easily repelled the first uncoordinated British attacks. Cornwallis's appearance with artillery and fresh regiments after a bloody ten-minute melee between the best regiments in each army convinced Greene it was time to save his Continentals to fight another day. Greene thus abandoned his cannons but saved his tired Maryland brigade by covering the withdrawal with his relatively fresh Virginia Continentals, allowing Greene's army to withdraw to Speedwell Ironworks safely. [31]

After issuing congratulatory orders and a double ration of rum to his surviving men, Greene noted: "The battle was long, obstinate and bloody…But the enemy have been so soundly beaten, that they dare not move towards us… Except the ground and the Artillery they have gained no advantage, on the contrary they are a little short of being ruined." Of the 2,550 British and Hessian troops committed to battle, ninety-six were killed in combat, while 413 were wounded –– a 20% casualty rate. By contrast, Greene's army of 4400 Continentals and militiamen suffered ninety-four dead and 220 wounded–– a 7% loss rate. Greene's rapid withdrawal was made possible by leaving the dead and non-ambulatory casualties on the battlefield. Cornwallis' army camped on the battlefield, and the regimental surgeons set up field hospitals at the nearby Hoskins farmstead and the New Garden Meeting House. Details of soldiers and sympathetic Quakers took the British wounded to New Garden and collected the American wounded at Guilford Courthouse. [48,53]

Here, Cornwallis' decision to destroy his excess baggage and tentage contributed to many wounded troops dying from exposure, as described by British commander Brig. Gen. James O'Hara: "I never did, and I hope never shall again, experience two days and Nights, as these immediately after

the battle…we remained on the very ground on which it had been fought cover'd with Dead, with Dying and with Hundreds of Wounded…A Violent and constant Rain that lasted above Forty Hours made it equally impracticable to remove or administer the smallest comfort to many of the Wounded." The British regimental surgeons (who apparently accompanied the army into battle) were so overwhelmed by the number of casualties that Cornwallis requested help from Greene. Greene consented by requesting safe passage for Dr. James Wallace of the 3rd Continental Dragoons, who worked alongside the enemy surgeons in triaging and treating the casualties. Cornwallis' narrow tactical victory nevertheless damaged his army so badly that he abandoned the offensive and eventually withdrew to friendly lines at Wilmington, North Carolina. Seventeen wagons filled with less seriously wounded and sick soldiers followed the army to Wilmington, while the British surgeons left their most seriously wounded with the compassionate Quaker caregivers. [48-49, 55]

The American general hospital remained at the Perkins' farm on the Dan River under the supervision of Dr. James Browne. At the same time, Dr. William Read apparently set up a flying hospital at Speedwell Ironworks. Browne penned an update to Greene on 2 April, noting the "wounded at [Col. Peter] Perkins' are all in a fair way of Recovering," while the wounded at Guilford Courthouse "…will not recover so fast from the badness of their wounds." Browne also asked for disposition instructions for "Soldiers who have been receipted for and are recovered of their wounds" –– presumably wounded British prisoners who were subsequently transferred to prisoner-of-war camps after their recovery. Dr. Fayssoux joined the army after being released in a prisoner exchange at Charleston in March 1781. [56]

The War of the Posts

After watching Cornwallis slip into Wilmington, Greene watched for a few days while considering his options. On 28 March 1781, Greene broadly outlined his vision for the next phase in the campaign, which was to march rapidly and defeat the remaining British forces in detail:

> *"…remote from reinforcements, inferior to the enemy in numbers and no prospec[t] of support I am at a loss what is best to be done…In this critical and distressing situation I am determined to carry the War immediately into South Carolina. The Enemy will be obliged to follow us or give up their posts in the State. If the former takes place it will draw the War out of [North Carolina] and give it an opportunity to raise its proportion of men. If they leave their posts to fall they must lose more there then they can gain here…*[57]

Cornwallis saw Greene go southwards but instead marched his army northwards in mid-April 1781 to join British forces in Virginia. Cornwallis reasoned to Clinton that securing Virginia would cut off reinforcements and supplies to Greene's army, thus laying the conditions for a subsequent counteroffensive in the Carolinas. Cornwallis also hoped a move into the temperate climate of Virginia might improve the health of his surviving troops. The British instead found the Chesapeake region equally pestilent, and scores were sickened and died from malaria, typhus, and even smallpox. The diseases drained the fighting strength of the British troops and contributed to Cornwallis' defeat and surrender at Yorktown in October 1781. [13-14, 31]

Greene paid close attention to the logistics preparations for the southward movement, ordering the establishment of magazines (small supply caches) at key road junctions. Besides the normal supplies of uniforms, cartridges and provisions, Greene authorized Colonel William R. Davie –– the quartermaster general of the Southern department–– to contract for "spirits," wine, sugar, and coffee that would relieve "The distress of the sick." Local merchants generally refused to accept depreciated Continental dollars in payment, so Greene authorized Davie to render payment with a bill of exchange drawn against French credit. Greene then ordered Davie to ensure the supplies reached the magazine at Charlotte to support a new flying hospital organized by Dr. Browne. [58]

Greene started his counteroffensive by attacking the supply-rich Camden outpost with his army of 1300 Continentals and 250 North Carolina militiamen. Meanwhile, Gen. Thomas Sumter and Col. Francis Marion were asked to attack enemy supply lines. Greene paused at Hobkirk Hill north of Camden, South Carolina to away reinforcements, Lt. Col. Francis Lord Rawdon, the overall British commander in Cornwallis' absence, launched a spoiling attack on the Americans on 25 April 1781. The American officers rallied their men and inflicted heavy casualties with musket and cannon fire, while Greene ordered Lt. Col. William Washington's dragoons to attack Rawdon from the rear. At the point of victory, the veteran 1st Maryland fell into disorder, forcing Greene to break contact and withdraw unmolested by Rawdon's exhausted troops.[31]

The light troops helped recover some of the American dead and wounded, but those within the range of the enemy guns were left on the battlefield. On the 26th, Rawdon wrote to inform Greene that the British troops were collecting the American wounded to the general hospital at Camden. Rawdon also complained that three of his surgeons had been taken prisoner when Washington's dragoons overran the British flying hospital during the battle. Rawdon asked for the release of his surgeons, offering to release American surgeons held at Charleston in exchange. Greene promptly responded by discharging the British surgeons with the expectation of a reciprocal release and thanking Rawdon's surgeons for caring for the American wounded. Greene closed his message by noting the injured British prisoners

were receiving similar good care. The battle proved short but bloody, with 258 British casualties from 900 engaged, while Greene's larger army suffered 270 dead, wounded, and missing. [59]

Both commanders soon realized the American failure at Hobkirk Hill had done nothing to change the strategic picture. Greene's army merely withdrew to the old Camden battlefield, while light forces under Col. Francis Marion and Gen. Thomas Sumter continued to raid British lines of communication. On 10 May 1781, Rawdon withdrew the Camden garrison, local Loyalists, and supplies southwards to Monck's Corner. [31]

Meanwhile, Greene marched his army rapidly 100 miles westward to assault Ninety-Six. The Loyalist garrison under Lt. Col. John Harris Cruger refused to surrender, so Greene's army laid siege to Ninety-Six on 22 May 1781. The American sappers found themselves outmatched by the desperate and daring Loyalist defenders. On 12 June, Patriot scouts reported that Rawdon was en route with 2000 fresh troops to relieve the garrison. Greene opted for a frontal assault on 18 June 1781, but a surprise Loyalist counterattack defeated the forlorn hope. The Americans incurred thirty-one dead and ten seriously wounded, with many more bearing minor wounds. Loyalist losses for the whole siege were only eighty-five. [63]

Greene lingered briefly at Ninety-Six to retrieve the dead and wounded during a humanitarian ceasefire brokered with Cruger. The wounded Americans faced further delays in receiving aid, as Greene had previously sent the baggage train and flying hospital to a safe position away from the British relief force. On 20 June 1781, the American army quietly withdrew eastwards across the Broad River. Rawdon's relief column arrived on 12 June 1781 after a forced march through sweltering heat that killed fifty of the unacclimated new British troops. Rawdon opted not to pursue Greene but instead preserved the energy of his able-bodied men to load wagons with casualties and movable supplies. Rawdon withdrew down to Monck's Corner, while Greene took his Continentals to the High Hills of the Santee River, and both sides tacitly suspended major operations until cooler weather. In the interim, Greene received welcome news from Doctor Browne, who proudly reported returning over 200 sick and wounded men to the army, indicative of improved operations at the Charlotte general hospital.[31,60-62]

The good news was offset by chronic shortages of all supplies, particularly in medicines and dressing materials. Cinchona shortages were due to difficulties in obtaining the drug from Spanish authorities. However, most shortages stemmed from the lack of hard currency. In September 1781, Greene appointed Dr. Robert Johnson the deputy hospital purveyor for the Southern Department, responsible for "…procuring an immediate supply of Stores for the relief of our suffering sick, and as there is no money in the Military Chest…I do hereby promise to give orders on any of the States…for the payment of all such articles as the Doctor may contract…" Greene and Johnson obtained enough medical supplies through such risky expedients to keep the surgeons in business. [63]

Greene returned to active operations in early September 1781 with about 1250 Continentals and the same number of militiamen and light troops. He faced a much attenuated British force of 2000 soldiers commanded by Lt. Col. Alexander Stewart, who replaced a sickly Rawdon. Stewart's troops were mostly recruits unused to the South Carolina climate, and perhaps a quarter were too sick for active field operations. Before leaving Camden, Greene ordered "…the sick and those unable to march will remain at Camden; a Sufficient number of Women, particularly those that have Children must be left as nurses…" He also stipulated that the quartermaster and commissary deputies would supply wagons and provisions for the flying hospital to accompany the army. Greene took a circuitous route from Camden in an unsuccessful attempt to surprise Stewart's force, which was foraging near Eutaw Springs. A clash between mounted troops on 8 September 1781 evolved into a full American assault on the British troops arrayed near Eutaw Springs. The British line fended off the initial militia attack before collapsing before a bayonet assault by Greene's fresh Continental regiments. Greene then committed his reserve to exploit the enemy disorder. Still, a stubborn rearguard by British light troops allowed Stewart to rally his soldiers to hold off the disordered (and possibly drunk) Americans. Greene gave up after two hours of heavy combat, ordering: "The Troops will Encamp as they lay last Night & refresh themselves. The Wounded are to be carefully Collected & dressed, & the Prisoners of War sent off." Yet, many dead and wounded Americans lay within range of the British weapons, compelling Greene to negotiate a truce with Stewart for the safe retrieval of the wounded and internment of the fallen. The American wounded were evacuated to Camden, while the British convoyed their casualties down to their general hospital at Charleston. Greene's army incurred 139 dead and 379 wounded, roughly 25% of his pre-battle strength, while Stewart reported 84 dead and 351 wounded–– a 20% loss rate. [9-65]

Stewart's tactical victory at Eutaw Springs did nothing to halt the general collapse of the British hold on the southern states. General Alexander Leslie, the overall commander in South Carolina, was compelled by the heavy losses to contract the defensive perimeter around Charleston further. Meanwhile, Greene took his dispirited Continentals back to the High Hills of the Santee while Whig militia patrols kept watch on the British. Greene soon received welcome news of Cornwallis' surrender at Yorktown in October 1781, prompting a return

to active field operations. He left behind Dr. Fayssoux and a flying hospital at Cheraw to care for the sick, while Dr. Browne continued running the Charlotte hospital. Greene found the British no longer willing to risk heavy casualties in a lost cause; they ceded all but the fortified zone protecting Charleston. [3, 62,66]

Greene maintained a close watch on the British lines to prevent any resurgence of activity, a difficult proposition with an increasingly sick and disaffected Continental army. He was joined by reinforcements under Generals Anthony Wayne and Arthur St. Clair in January 1782. During the summer of 1782, many of the new, unacclimated Pennsylvania and Virginia troops fell prey to malaria and yellow fever–– although new supplies of Peruvian bark alleviated their symptoms. Over 200 Americans died from malaria, while practically everyone else, including Greene and his senior staff, were sickened by the disease. The British would remain in their Savannah and Charleston enclaves until their final withdrawal in December 1782. On 14 December 1782, Greene's army seated the South Carolina government in Charleston, marking the end of the southern campaign. The Americans also liberated the remaining prisoners held in Charleston, including Dr. Thomas Tudor Tucker, who was the final director of the the Continental general hospital. Greene, meanwhile, appointed Dr. Oliphant as the Deputy Medical Director for the Southern Department. Greene remained in place to orchestrate the furlough and discharge of the remaining healthy veterans. Still, the large numbers of sick during the summer of 1783 delayed the northward shipment of men to Philadelphia and Baltimore. [2,67]

AFTERMATH AND CONCLUSIONS

This article examined how the British and Americans organized and modified their medical systems throughout the southern campaign. Army historian Mary C. Gillett astutely described the American medical establishment in July 1775:

> *A staff for the most part totally unfamiliar with military medicine, handicapped by a serious and chronic shortage of drugs…was expected to provide uniformly competent care for an untrained army whose health was jeopardized by poor hygiene and frequently inadequate food and clothing…. the medical service was all too frequently unable to provide adequate and compassionate care, even by 18th Century standards, for the Army's ill and wounded.*[2]

By contrast, the British armed forces were backed by a well-established and financed military establishment run by broadly competent and skilled professionals. –– who, as Paul Kopperman noted, were "…only as successful in treating illness and injury as the contemporary medicine and drugs permitted." The British had decades of experience planning and executing expeditionary operations and were familiar with the dangers of conducting military operations during the 'ague' season. The British army that invaded South Carolina in early 1780 was supported by an adequate number of physicians who were, if not formally educated, experienced in the contemporary art and science of military medicine. By contrast, Continental and militia units had to recruit physicians and mates from private practice, and those men had to learn military medicine from bitter experience on the battlefield and in the bivouac. Matters were more difficult in the southern states, as very few doctors and physicians had graduated from formal medical schools. Despite those handicaps, the Continental Army developed a medical system that compared favorably to the British Army. Few primary source accounts describe exactly how each side performed battlefield medicine, but enough evidence exists to show good coordination between commanders and physicians at each medical echelon. The Revolutionary War in the South was also characterized by a surprising level of compassion–– at least among the regular troops. Battles generally ended in a truce that allowed for the impartial collection, treatment, and safeguarding of wounded soldiers. [26,46]

Commanders on both sides were keenly aware of their responsibilities to safeguard their men from disease, as evidenced by their orders and actions. Clinton planned his assault on Charleston during the cooler winter months, but winter storms and an unexpectedly stubborn American defense delayed the operation into the dangerous hot season. Clinton and Cornwallis pinned their hopes on recruiting enough southern Loyalists––men who would have some natural immunity to malaria––to secure the interior, thus allowing a curtailment of summertime operations for unacclimated European and Loyalist troops. The rampant attacks by Whig insurgents during the summer and fall of 1780, especially at places like Kings Mountain, overmatched their Loyalist enemies. As a result, Cornwallis had to deploy British, German, and northern provincial soldiers to interior posts at Camden, Ninety-Six, and Cheraw––where hundreds were sickened, and dozens died or were permanently disabled by malaria. Medical historian Peter McCandless harshly criticized Clinton and Cornwallis for conducting summertime operations with their regulars and northern provincials. Yet Greene's strategy of exhaustion compelled the British to fight or lose their hard-won gains. Greene could employ acclimated Whig militia forces to maintain pressure on the Loyalist militia forces year-round, allowing the Continentals to curtail active campaigning until the onset of cooler weather. The Americans also benefited from greater (if not uninterrupted) access to cinchona bark to treat malarial symptoms. Paul E. Kopperman best summed how medical aspects influenced the outcome of the campaign: "The rapid erosion of the British forces in the South had less to do with the quality of the medical services than with the objectives of the expedition and the strategies employed by Cornwallis and his subordinates in an effort to achieve them."[14,23, 26]

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"Medical Tools of the Trade in the American Revolution"

Scott C. Woodard, MA

Nearly six weeks after the formation of the Continental Army, the Congress established "an hospital" department for the Army on July 27, 1775. The medical services did not start from scratch. As the new Army formed from existing colonial militias and private citizens, so too the Hospital Department emerged from militia *chirurgeons*, apothecaries, and hometown practitioners of *Physick*. The Hospital Department requisitioned medicines through an apothecary and logistical support (transportation, patient food, hospital space, surgical instruments, and materiel) under a purveyor. This article will focus on a sample of items under the purveyor's purview that foreshadows today's medical logistician.

The new Army struggled with all forms of sustainment ranging from gunpowder, uniforms, and foodstuffs. Medical devices and drugs were no different. In assuaging the fevered brow and mending the wounds of war, these new Continental Army surgeons initially carried the tools of their trade from their private practice. By September 1775, the Army was plagued by extreme shortages of medical supplies and a Medical Committee was established by the Continental Congress to directly manage the medical department. Despite lawmakers continued involvement and micro-management in the daily administration, shortages of drugs caused many individual State Committees of Safety to intervene on behalf of their sons in service.[1(22-29)]

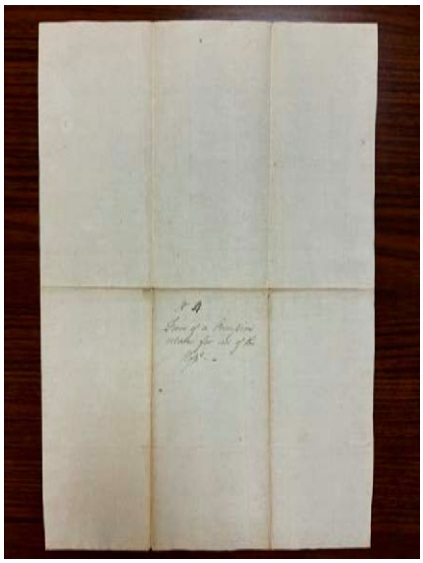
The Continental Congress' vague delineation of the Hospital Department leadership and several decentralized purchase authorities compounded the medicine and instrument shortage. Freedom seeking, independent colonies and their militias were at odds with an inherently weak centralized authority. Between the Director General in charge of the general hospitals, regimental surgeons providing care in their respective regiment, and regional Hospital Department Directors vying for control, all authorities competed for the same sources of supply and methods of distribution. The responsibility of procurement was doled out to each regional or provincial department, with no centralized guidance or authority. In delegating responsibility without the authority, the Continental Congress lacked plans to prevent patient suffering. Investigations and infighting were addressed January 9, 1777, when the Continental Congress dismissed the Hospital Department director general and director of the northern department hospital.[1(22-49)]

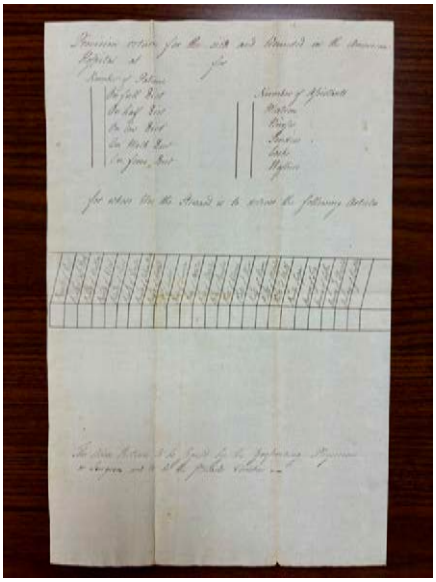
The Continental Congress legislated reforms in 1777, 1778, and 1780 delineated medical authority and established a centralized Hospital Department under the final reforms. Having both served in similar positions within regional departments, Thomas Bond, Jr. served as the first Purveyor and Andrew Craigie served as the first Apothecary. Together, the Purveyor (hospital beds, instruments, dressings) and Apothecary (medicines, compounding) received requests for medical goods to purchase and subsequently deliver to the hospitals and various regiments short of these critical supplies and equipment. However, the shortages reflected the universal shortages of all supplies during the war. Congressional funds promised, but never delivered, hurt the ability of doctors to provide aid through medicine, surgical instruments, patient food, and patient clothing. Instances of shortages in 1781 were so severe, physicians were unable to reconcile their accounts from the lack of paper. Many hospital staffs sent out their ambulatory wounded to beg for food. Lack of reimbursed payment for personal expenses crushed the individual medical doctors who were asked to provide their own surgical instruments. The Continental Congress urged Bond to solicit old linens to provide for requested dressings. The sufferings of patients for want of medical supplies was only relieved by French funds and reduced patient loads at war's end.[1(35-49)]

One can reason that the knowledge of medicine, in modern view, was grossly lacking. It was an art of observation without clear understanding of modes or vector of transmission. Without the knowledge of true science and germs, there was not too much a surgeon could do. However, the dutiful nurse or doctor could aid in the recovery of the sick and wounded through proper diet, rest, and care. Even of this small need, the sick and wounded did not have.[2]

James Tilton, a physician and surgeon in the Army during campaign and in military hospitals (also a future Surgeon General), placed strong emphasis on military hygiene and adherence to rules for the prevention of disease. He noted the importance of avoiding excessive exposures to unnecessary high temperatures, maintaining cleanliness of latrines and uniforms, and placing older soldiers with new recruits to teach them how to properly prepare meals in their mess. Tilton believed it was crucial to separate the men suffering the fevers from those wounded in battle. His concern over unsanitary conditions in military hospitals led to the design of isolation wards and improved ventilation to avoid contagion.

Fig 1. Suggested Form of a Provision return for the use of the Hosp" designed by Surgeon James Tilton in 1779 for use by military staffs to manage patient diets and account for foodstuffs ranging from "Pounds of Beef" to "Ounces of Butter." (National Library of Medicine photo by Scott C. Woodard)





His design of a hospital made with logs, fireplaces in each of the isolated wards, and vented roofs were modeled after similar huts by Native Americans.[3]

The tools of the trade reflected two general medical thoughts that the body was well when all the "humors" (blood, phlegm, yellow bile, and black bile) were in balance and the emerging explanation of illness in terms of chemical and physical qualities (acidity and alkalinity; tension and relaxation). Illness, the greatest killer of soldiers, resulted from too much or too little. Injury was mitigated by artificially balancing the humor or quality that was in excess. Medicines that purged and surgical instruments that bled were the means and devices that brought about balance intervention.[1(1-2)] As medical knowledge transformed from the ancient thought that supernatural events caused disease, physicians began to understand that illness was a reaction from something in nature. This required practitioners to be observant and know their patient.

Whether dealing with the excess of humors or any undesired internal tensions, the goal of changing the body's imbalance was still desired. Lancets, scarificators, and cupping devices were some of the tools utilized in releasing the unwanted fluids from the body in the form of bloodletting. For example, a lancet or fleam was used to cure inflammation when used to lacerate the skin promoting the loss of the accumulated blood.

Fig 2. Surgeon James Tilton knew from observing what he termed "Indian huts" that smoke from a fire flowed through a vented structure. In his opinion, this allowed for the contagion to follow along the path of the smoke through the building and provide for a better patient outcome. Evidence gathered by the British in the Crimean War would later prove this theory that a well-ventilated hospital was much more effective than closed private homes. (Photo by National Library of Medicine)

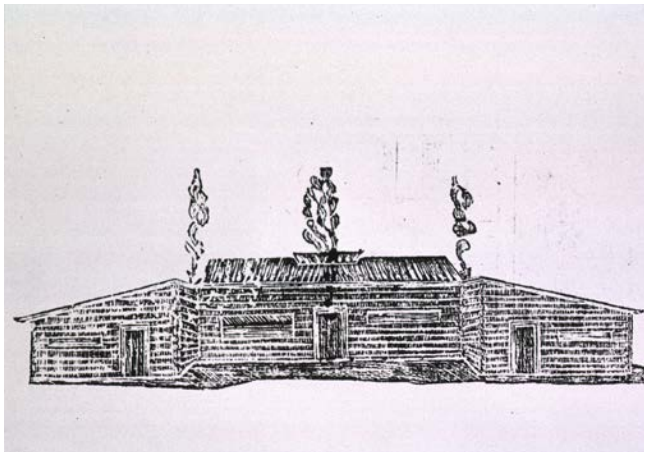
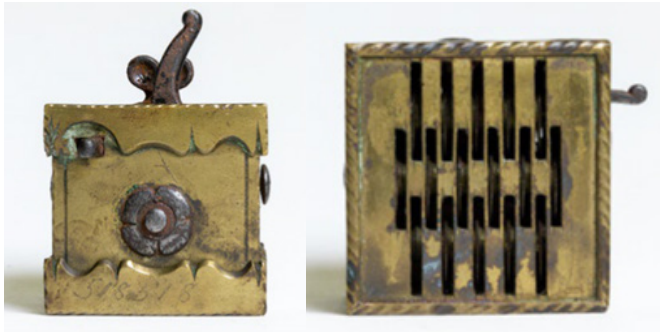


Fig 3. Believed to date from the late 18th Century, this spring lancet was used for bloodletting. After the handle above the blade was cocked, the instrument was placed against the patient's skin. When the trigger on the side of the instrument was pressed, the spring was released pushing the blade into the skin. (National Museum of Health and Medicine photo illustration by Matthew Breitbart/ Released)

Fig 4. This fleam dates from the early 18th Century and was used by surgeons for bloodletting. (National Museum of Health and Medicine photo illustration by Matthew Breitbart)

Fig 5. His scarificator is signed "Joh Joseph Hess Hochen Salzburg" (Austrian Empire) and is believed to date from the 18th Century. On the left is the view from the instrument's side while the right picture is looking from below where 16 small blades emerge. (National Museum of Health and Medicine Photo by Ian Herbst.)



A scarificator was an instrument used in the hands of the surgeon. Developed early in the 18th Century as a humane and efficient instrument in bloodletting, it was spring loaded making multiple small cuts. A cocking handle on the top placed tension on a spring, and the trigger on the side released the blades to pierce the patient's skin.

Assisting in the blood release, cupping devices were used to pull the fluid to the surface enabling the excess fluid to leave the body. Wet cupping cups or glasses were used for vacuum assisted bloodletting when applied over a puncture. An open flame was placed in the glass and extinguished after heating. The cup was placed on the laceration, created a suction, and

Fig 6. This wet cup example was used in the last quarter of the 18th Century and would have been produced and sold in a set. (National Museum of Health and Medicine photo by Matthew Breitbart)

Fig 7. Surgeon James Thacher would have been familiar with a kit like this general surgery case of surgical instruments. These instruments were used by Dr. Archimedes Smith, Assistant Surgeon assigned to the Lake Erie Squadron, United States Navy in 1814. The kit was probably also used in the American Revolution. (National Museum of Health and Medicine photo by Matthew Breitbart)

raised the skin pulling the blood from the cut as it cooled. When there was no cut, it was referred to as dry cupping. Cupping has been practiced across a variety of cultures and is associated with the balancing of qi/chi, with humoral theory, and in recent years with stimulation of blood flow to superficial muscle tissues.

The most desired and scarce instruments were tools for amputation and trepanning, lancets, bullet extractors, incision knives (scalpels), catheters, and needles. In support of these surgical tools, the surgeon needed lint, rags, bandages, tourniquets, and ligatures. The few supplies on hand were normally private property. All regiments were deficient and dependent upon Congress for funding to resupply their stores.[4] Following the Battle of Saratoga there were about 1,000 patients in the hospital complex consisting of private homes and a church. Surgeon James Thacher, who served as both a field regimental surgeon and garrison hospital physician, remarked in his journal following the British surrender in October 1777 that he normally spent his time caring for patients from 8:00 am until the late evening hours. It was this scene that served as a "fine field for professional improvement. Amputating limbs, trepanning fractured skulls, and dressing the most formidable wounds."[5] The young surgeon was very familiar with the instruments of an amputation kit. Because there was no anesthetic to put a patient to sleep, the worth of a surgeon was often measured by his speed. Doctor John Jones, another Continental Army regimental surgeon, was well-known during this time for his medical and surgical text, *Plain Concise Practical Remarks on the Treatment of Wounds and Fractures*. His text was used throughout the young Hospital Department.[6] When weighing the necessity of amputations in front of a patient, Jones implored his readers to adhere to the maxim *festina lente* [make haste slowly] by deliberating the necessity and possible outcomes, to appear confident, and to "avoid terrifying him with the appearances of the apparatus" in the surgery.[7]

The early history of Army Medicine of the United States is a tale marked with scarcity of supplies and conflicts in agendas. Like the rest of the Continental Army, and the nation, the Hospital Department emerged from the revolution intact despite its own efforts. While the exact same instruments from the 18th Century are not used today, our modern tools reflect Army Medicine's past. *Experientia et Progressus.*

[The author would like to express his thanks to Alan J. Hawk of the National Museum of Health and Medicine for his assistance in accessing the instruments for this article.]

Fig 8. Amputation instruments belonging to Dr. Benjamin Tredwell Jr. Tredwell served in the Seven Years War and War of 1812. The smaller knife was used for small digits such as fingers, the medium knife was used for legs and arms, while the largest was used for cutting near the thigh. Each sickle-shaped knife cut in a circular fashion around the limb.[8] Tenaculum were used to pull blood vessels to move out of the way or tie off. The tissue retractor enabled the surgeon to pull away soft tissue to have access to an area. The forceps held tissue while the bullet extractor could pull a lead ball once discovered in the patient's wound. (National Museum of Health and Medicine photo by Matthew Breitbart).

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Student Papers

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Mission Command in Action: The Siege of Jadotville

Duffy, Austin, CPT

LEGACIES OF LEADERSHIP

Throughout military history, numerous commanders and leaders have successfully applied the principles of mission command. For example, mutual trust and decentralized command enabled soldiers from the 101st and 82nd Airborne Divisions to accomplish key objectives during the Battle of Normandy despite being scattered due to unfavorable weather and enemy fire.[1] More recently, thanks to a shared understanding of mission objectives, SEAL Team 6 executed a raid and successfully captured Osama Bin Laden.[2] However, examples of successful mission command are certainly not exclusive to US forces. When a small contingent of soldiers from A Company, 35th Irish Infantry Battalion, received orders to occupy a remote city supporting United Nations (UN) peacekeeping efforts in the Congo, they did not anticipate a scenario where their lives would be in jeopardy.[3] A Company's fight for survival while besieged is a worthy addition to the records of successful military operations. Due to the competence, shared understanding, disciplined initiative, risk acceptance, and mutual trust demonstrated by Commandant Patrick "Pat" Quinlan during the Siege of Jadotville, the soldiers of A Company returned home to their loved ones, despite being outnumbered and outgunned.

HISTORICAL CONTEXT: THE CONGO CRISIS

The Siege of Jadotville began amid the Congo Crisis, a period of intense political and military turmoil that erupted after the people of the Congo declared independence from Belgian rule. Within days of the June 30, 1960 declaration, the Congo became chaotic as regional separatists and foreign mercenaries vied for power.[4] The Katanga Province, rich with minerals such as copper, uranium, and gold, accounted for a disproportionate amount of wealth compared to other provinces in the Congo. Wishing to maintain control of the region's wealth, the Katanga Province, led by Moise Tshombe and backed by European allies, seceded from the newly formed Democratic Republic of the Congo. Bolstered by Katangese forces, Belgium mercenaries trained and equipped a large private army using money from Belgium-owned mining companies in the province.

As a result of the rising tensions and political instability between the Katanga Province and the Democratic Republic of the Congo, western nations feared the Congo would become the subsequent Cold War battleground.[5] In response, the UN formed the United Nations Operation in the Congo (ONUC) in July 1960 to maintain order until diplomatic solutions could restore peace. In August 1961, the UN launched Operation Rum Punch to remove foreign mercenaries supporting Katanga's secession. The operation was a minor success, but more drastic reductions were needed. The following month, the UN launched Operation Morthor to remove separatists from their strongholds across the Province of Katanga. In retaliation, Katangese forces launched targeted attacks on isolated UN contingents, one of which was in Jadotville.

OVERVIEW OF THE SIEGE

The Siege of Jadotville began on September 13, 1961, when A Company, a small force of 155 Irish soldiers was surrounded by nearly 3,000 Katangese troops backed by Belgian mercenaries. For five days, the soldiers stood their ground despite overwhelming challenges. An unwavering commitment to mission command principles empowered the soldiers to respond with agility and determination, transforming a steadfast peacekeeping mission into a profound example of courage, bravery, and resilience.

Competence

Individual mission command principles successfully implemented by Commandant Quinlan significantly impacted the Battle of Jadotville. While all mission command principles are essential, one could argue that competence is the foundation for all other principles. Commandant Quinlan's steadfast competence, a cornerstone of his leadership, was the first mission command principle that played a decisive role in shaping the outcome of the Battle of Jadotville. Commandant Quinlan demonstrated the principle of competence during the Siege of Jadotville through his proactive preparations, tactical insight, and effective management of limited resources. After arriving at Jadotville, Commandant Quinlan quickly realized their location left his troops isolated and vulnerable to attack. He instructed his men to follow company standard operating procedures (SOPs), reinforce the perimeter, and set up overlapping fields of fire—despite no immediate visible threats and a general sentiment from higher headquarters

that an attack was unlikely. This proactive measure enabled the men of A Company to endure multiple waves of enemy attack, artillery bombardment, and fighter jet strafing runs. Battle veteran John Gorman, a 17-year-old private at the time of the Siege, would later say in an interview with History of War, "There were only 155 of us, but we were so well organized and dug in…we were very well prepared for a bunch of young Irish lads that had never been out of the country before, and it was just amazing."[6]

Communication and Shared Understanding

Commanders must maintain open and transparent communications with their soldiers and exhibit a demeanor that reinforces their message. This communication style ensures a shared understanding, forming the basis for unity of effort, subordinates' initiative, and effective decentralized command. Throughout the Siege, Commandant Quinlan regularly met with company leaders to share updates and gather feedback from his troops. He demonstrated the principle of shared understanding by ensuring his troops were fully aware of the mission objectives, their roles, and the overall strategy to ensure success. Commandant Quinlan also made it clear to his men that their mission was to defend their position and not attack since they were there as peacekeepers. As a result of the shared understanding created by Commandant Quinlan, A Company made the honorable decision to hold their fire and avoid unnecessary deaths, even when his men had the opportunity to cause mass casualties in response to enemy forces gathered in large, threatening groups preceding the attacks.

Adaptability

Adapting to unforeseen threats and capitalize on new opportunities is critical during military operations. Commandant Quinlan made several key decisions to maintain the unit's defenses during the Siege. For example, upon noticing a rise in local hostilities, he ordered his men to stockpile pile water and ration food. This foresight proved a wise decision after enemy forces shut off the water supply to the buildings occupied by the unit. Commandant Quinlan continuously assessed the situation and made tactical adjustments, such as repositioning his troops and changing defensive tactics to counter enemy attacks. His proactive defense measures and effective management of scarce supplies empowered his men to hold off enemy forces for five days without reinforcements, resupply, or loss of life.

Commandant Quinlan's ability to improvise and adapt was crucial in maintaining the A Company's defenses during the Siege. However, after five days of intense fighting, it became clear that reinforcements and resupply were not coming.[7] To prevent unnecessary causalities, Commandant Quinlan made the decision to surrender. Though controversial at the time, Quinlan's decision was in the best interests of his men and demonstrated the ability to take initiative in the absence of orders. Simply put, Commandant Quinlan's ability to analyze, adapt, and act independently was instrumental in the survival of his troops during the Siege.

Risk Acceptance

Risk is inherent to military operations. Commanders must consider risks to the force and the mission against perceived benefits when deciding on a course of action. During the Siege of Jadotville, Commandant Quinlan demonstrated risk acceptance by continuing the mission despite being isolated and under-equipped. He understood his position was vulnerable, and engaging in combat with a much larger and better-equipped force could lead to significant casualties. Despite this, he remained steadfast. Commandant Quinlan ordered his men to "dig in," use tactical approaches to fight smart, conserve ammunition, and strategically use mortar fire to mitigate the risks.[8] However, as the Battle progressed, it became clear that A Company's position was untenable, and further resistance would only lead to unnecessary loss of life. Commandant Quinlan's decision to surrender illustrates his awareness of the dangers of unnecessary risk and demonstrates how calculated risks preserve combat power.

Mutual Trust

Mutual trust is the shared confidence between commanders and their subordinates, and it is essential to successful mission command. Commandant Quinlan demonstrated the principle of mutual trust during the Siege of Jadotville by fostering strong cohesion and confidence among his men. He built mutual trust and respect by leading from the front and sharing the same risk as his men. Private John Gorman recalled the following statement about Commandant Quinlan and his senior NCO Jack Prendergast when interviewed for the book *The Siege of Jadotville: The Forgotten Battle*, "They were a marvelous pair, a great officer and sergeant…as long as we were with them, we felt invincible."[9] Through his leadership, Commandant Quinlan and his men embodied the principle of building cohesive teams through mutual trust, which kept ‹A› Company strong and united in the face of overwhelming odds.

CONCLUSION: LESSONS LEARNED FROM JADOTVILLE

In conclusion, Commandant Pat Quinlan's leadership during the Siege of Jadotville showcased the power of mission command principles and their critical role in the Battle. Through his proactive preparation, clear communication, adaptability, and tempered risk acceptance, Quinlan led a small group of Irish soldiers to hold off an enemy force roughly 20 times their size. The tactics and initiative Commandant Quinlan displayed serve as a powerful example for future leaders, showing how effective command under pressure can change the course of a battle.

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Conclusion: Constituent Part of the Army

Steven C. Craig, COL (Ret.), DO, PhD, FRCP

STANDING ARMIES: "THE NURSERY OF VICE AND THE BANE OF LIBERTY"

The 1776 constitution of Virginia stated that "standing armies, in time of peace, should be avoided, as dangerous to liberty: and … in all cases, the military should be under strict subordination to, and governed by, the civil power." Other states echoed this.[1]

In the immediate post-war years, Americans feared not only standing armies, but also Congressional power to raise them in peacetime. Radical Whigs, whose sentiment had influenced the revolutionaries strongly, and their political power decided that the defense of the country would be provided by militia and volunteers.[1] By June 1784, the Continental Army consisted of 80 men with no medical support. The April 1785 Congressional calls for 700 militiamen from Pennsylvania, New Jersey, New York and Connecticut with one surgeon and four surgeon's mates to protect military supplies and frontier settlements caused some concern, especially among the Massachusetts delegation.[2,3]

On 27 December 1792, Congress reorganized the army as the Legion of the United States and Major General Anthony Wayne was named commander. The Legion was authorzed a Surgeon-General and six surgeon's mates for garrison duty; the four sublegions (each 1,280 men) each had one surgeon and 3 surgeon's mates. The Legion only lasted until May 1796 when another reorganization created an army of four infantry regiments, two light dragoon companies, and the Corps of Artillerists and Engineers. There was one surgeon and two surgeon's mates per regiment, one surgeon and four mates for the artillerists and engineers. No surgeon or mate was assigned to the dragoons, who, presumably, received medical care from surgeons assigned to the infantry.[2,] Although General Wayne had used an enlarged Legion augmented by Kentucky militia to win the Battle of Fallen Timbers in 1794, and Congress authorized bringing the Legion to full strength, President Washington abandoned the Legion in favor of a more conventional force in May 1796.[3]

During this time, a foreign disregard of United States sovereignty became a critical issue. The attacks by Barbary pirates on American ships in the Atlantic prompted the passage of the Naval Act of March 1794. Six frigates – *United States, Constitution, Constellation, Chesapeake, Congress,* and *President* – were built and carried 36 guns each.[4]

Tensions with Great Britain over border disagreements, trade, and British forts in the Northwest Territory initiated negotiations conducted by John Jay, Chief Justice of the Supreme Court. The treaty that bears his name was signed on 19 November 1794. It precluded war with Britain for 17 years.[5]

The Jay Treaty, however, insulted a suspicious revolutionary France. At war with Britain for a year, France interpreted the treaty as a violation of the 1778 Treaty of Amity and Commerce with the U.S., that is, loss of an ally against Britain. In late 1796, French ships began harassing American merchant ships. Diplomats sent to Paris were treated with contempt, bribery, and attempted financial extortion by the French government.[6]

An incensed President Adams and Congress, fearing war, created the Navy Department on 30 April 1798, directed our 25 ship navy to guard the coast closely, authorized a provisional army of 10,000 that the President could raise if needed, a Surgeon General, and as many surgeons and surgeon's mates as necessary, and ended all treaties with France on 7 July.[3,4] Washington was recalled from comfortable retirement to lead this army as a lieutenant general by President Adams with Alexander Hamilton his second-in-command.

Washington selected his old friend and French and Indian War comrade, Dr. James Craik, as his chief physician and surgeon. Craik was appointed Surgeon General on 19 July 1798 with the pay and emoluments of a lieutenant colonel but without rank.[7] Eight months later, as war appeared more eminent, an additional 24 infantry regiments, three cavalry regiments, a battalion of Artillerists and Engineers, and another regiment and battalion of riflemen was authorized. Each of these regiments was to have one surgeon and two surgeon's mates.[2]

On 2 March 1799, Congress passed an Act to Regulate the Medical Establishment:

"That in the medical establishment of the United States there shall be the following officers: A physician-general, who shall be charged with the superintendence and direction of all

military hospitals, and, generally, of all medical and chirurgical practice or service concerning the army and navy of the United States, and of all persons who shall be employed in and about the same, in camps, garrisons, and hospitals."[2]

This act made Craik, officially, the first Physician General of the Army and the Navy. It also authorized an Apothecary General, a Purveyor, and a "competent number of hospital surgeons, who shall be liable to serve in the field."[2]

The Quasi-War, as it is called, consisted of a couple of naval actions between American and French ships, but nothing more. After his 9 November 1799 coup, Napoleon began negotiations to end hostilities with the United States. The Quasi-War was officially over with the signing of the Treaty of Mortefontaine on 30 September 1800.[4] However, Congress began a reduction in force on 14 May. All but four infantry regiments, 2 regiments of Artillerists and Engineers, and two troops of dragoons were mustered out. Craik was discharged and the Medical Establishment vanished. March of 1801 saw only six surgeons and seven mates on duty. In March 1802, the army was reduced to 2 infantry regiments and one artillery regiment with two surgeons and 25 mates assigned to garrison and post duty, rather than to regiments. And at the end of 1807, only one surgeon was on duty in the United States Army.[2]

FRANCOPHILE FAILURE, WAR HAWKS, AND WAR

In 1803, a British-led third European coalition formed to defeat Napoleonic France. The Francophile Jeffersonian administration had attempted to maintain neutrality through a series of Non-Importation and Embargo Acts against Britain and France through March 1809. France ignored American neutrality and continued to prey on our merchant ships at will. Britain fumed over America's lack of support, her continued trade with France, and having filled Napoleon's coffers through the 1803 Louisiana purchase. More concerning was the fact that these efforts hurt American farmers and merchants more than the Europeans. Indeed, Jeffersonian policies gave the moribund Federalist Party a new lease on political life and generated dissent among Republicans.[8]

Upon his inauguration in March 1809, James Madison inherited a weak economy, weak army, and weak navy. His cabinet proved to be one the weakest in history. Conflicting interests between infuriated northern Federalists and southern and western isolationist agrarian Republicans, Madison's desire for sectional unity, and his own timidity resulted in stalemate. By the following year, however, as French and British contempt for American sovereignty on the high seas grew and the economy did not, Americans looked to war as a solution to these problems.[8]

The first session of the 12th Congress began 4 November 1811, and the House of Representatives was filled with young turks. Henry Clay of Kentucky led a group composed of John C. Calhoun and William Loundes of South Carolina, Felix Grundy of Tennessee, Richard M. Johnson of Kentucky, George M. Troup of Georgia, Peter Porter of western New York, John Harper of New Hampshire that would become known as the War Hawks. As Speaker of the House, Clay ensured they chaired or had majority votes on all the committees. These men were staunch nationalists, and their power grew as they expounded on the dishonor and indignities brought on the nation by Britain and France.[8]

President Madison's attitude also became more belligerent as his talks with the British minister came to naught. To Madison's dismay, Congressional wrangling over a large military and naval expansion caused delay. Finally, a bill was approved for 35,000 regulars, 50,000 militia, and the taxes – $3 million/state, a salt tax, and raising a loan of $11 million – needed to support a wartime army, but nothing for the navy. America was poised for war, and, in early March 1812, Madison presented letters from a disgruntled British spy, John Henry, to Congress. These missives incriminated Federalists in a British-led conspiracy to destroy the Union. Republican outrage echoed through the halls of the Capitol. This, combined with news that Britain still declined to negotiate, and France was burning American ships carrying grain to British General Arthur Wellesley's army in Spain, provided the impetus for a declaration of war on 1 June.[8]

Madison, Secretary of War Dr. William Eustis, and General Henry Dearborn conceived a three-pronged plan of attack against Montreal, and the Niagara and Detroit frontiers to interdict British supply ships coming down the St. Lawrence River. Sound in theory, the plan was too aggressive, too complex for the commanders, troops, and their medical support to accomplish.[8]

"MERE MENIAL DRUDGES OF THE CAMP."[2]

Although the war put a surgeon and two surgeon's mates into each regiment with no rank and the pay of a captain, medical officers were largely the unwanted appendages of an army; "menial drudges," as J. W. Daniels wrote to the Secretary of War Eustis in February 1810.[2]

No medical department was established, no surgeon or physician general was chosen to lead and manage field and garrison medical services, and no guidance on the duties and responsibilities of regimental surgeons was given. Dr. Eustis decided he could manage the War Department and needed no help to provide medical support in three independent war theaters. Indeed, he micromanaged all medical support: personnel, logistics, distribution of supplies and medicines,

and even the size of regimental medical chests. Regrettably, no foundational organization had been created to implement his orders.[8]

As during the Revolutionary War, all three field armies were often sick with the usual . . attacks on Forts George and Erie on the Niagara River supported by Commodore Oliver Hazard Perry's ships – against British forces in the spring of 1813. These successful offensives gave Americans control of the Niagara frontier and raised American troop morale. But the medical support soldiers received had changed little since the 1783 Treaty of Paris .[8]

Fortunately, a 67-year-old former medical officer, and now staunch War Hawk and Dover, Delaware physician, James Tilton, was amenable to serving his country once again.[10] During the second Morristown winter encampment, 1780-1781, Tilton, following Brocklesby's lead, had small, two room wards constructed to accommodate manageable numbers of soldiers with the same illness. These isolation wards reduced transmission of respiratory and gastrointestinal maladies and hospital gangrene. (During the Civil War, U.S. Army Medical Director, Jonathan Letterman employed the same techniques to the same end using tents rather than log structures.)

In February 1813, Tilton wrote *Economical Observations on Military Hospitals and the Prevention and Cure of Diseases Incident to an Army*.[11] Based on his intimate historical knowledge and personal experience of military medicine in wartime, this short treatise was directed at state legislatures, commanders, and medical officers. Tilton sent a copy of his pamphlet to Secretary of War Armstrong, who read it, appreciated its commonsense approach to military medicine, and convinced its author to accept leadership of the medical department on 11 June 1813.[8]

Economical Observations is reminiscent of Sir John Pringle's *Observations on the Diseases of the Army* (1752),[(12)] Donald Monro's *An Account of the Diseases which were most frequent in the British Military Hospitals in Germany, From January 1761 to the Return of the Troops to England in March 176. To which is added, An Essay on the Means of Preserving the Health of Soldiers, and conducting Military Hospitals* (1764),[13] and Benjamin Rush's *Directions for Preserving the Health of Soldiers, Addressed to the Officers of the Army of the United States* (1777).[14]

In its pages, Tilton reminded Congress of their responsibilities in establishing and maintaining a functional Army Medical Department. Indeed, he provided them with a viable operational blueprint for hospital facilities and personnel, and reviewed the consequences of their neglect. He instructed commanders in their preventive medicine roles and reminded them that medical officers were "only … adjutants in the recovery of the sick."[11] And he also reminded them, as Pringle had commanders 61 years previously,[12] that the "government of an army must be despotic" where soldier health issues were concerned.[11]

To the medical staffs, Tilton preached that the "cardinal … principle to be observed, in the direction of all hospitals, is to avoid infection … [W]here infection or foul air is suffered to prevail, no skill or address in practice can much avail. The cause must be removed, before the patients can be relieved by medicine."[11] To avoid infection, Tilton said there were three things to remember: proper hospital construction, personal cleanliness, and treatment of the patients."[11]

Physician and Surgeon General Tilton, like the War of 1812, is unfamiliar to many Americans. Yet, just as that war and its aftermath proved to be a transitional watershed in America's national development, so Tilton was a transitional leader in the development of the Army Medical Department. In *Economical Observations*, Tilton joined the sound discipline of British military medicine with the administrative, political, and operational struggles of the Continental Hospital Department and provided a foundation for a stable medical department. He preached this philosophy to a new generation of physicians and, just as importantly, to a new Presidential administration both of which were more receptive to change. Indeed, Tilton was the bridge that spanned the military medical abyss of the past 32 years.

As the war progressed with the capture of Fort Erie by General Jacob Jennings Brown, General Winfield Scott's impressive victory at Chippewa River, and the combined army and navy victory at Plattsburgh, Army Medical Department tactical support and care improved. However, the struggle for line officer respect continued. Dr. James Mann, director of the Malone, New York hospital told Tilton in November 1814 that "should the war be continued … it seems highly important, the medical staff of the army be placed on a more respectable basis … To judge the conduct of some officers of the line, towards the medical staff, particularly that branch attached to hospitals, it appears they are considered in no higher light than warrant officers … There is nothing in the rules and regulations of the army, to deter commissioned officers … from intruding within hospital bounds, and assuming authority to order their men in and out of it ad libitum."[8] Mann admitted that when such intrusions were reported to the commanding general, redress was obtained, however, it did "not place the hospital department beyond the reach of vexatious interferences."[8]

Mann also told Tilton that "In events of high importance, it is seldom the medical staff are noticed … It may be alleged, the surgeons being non-combatants are out of danger. This however is not always the case. During the investment of Plattsburgh by the enemy, the surgeons were constantly passing from fort to fort, or block-houses, to dress the

wounded, exposed to a cross fire of round and grape shot; while the greater part of the army were covered by fortifications."[8] Mann also wrote Vice President Elbridge Gerry about the government's responsibility to take care of disabled veterans.[8]

In December 1814, Tilton prepared new regulations for the medical department which were published by the War Department. As usual it defined the individual duties of all personnel but contained nothing to indicate that the physician and surgeon general had the responsibility and authority to direct the actions of his department as a unified whole.[8,15] For all of his stellar qualities, Tilton remained a man of an earlier generation. Neither those in the Madison administration, the generals in the field, nor Tilton himself could conceive of the medical department as a necessary and integrated supporting branch of the army, unified under one medical commander.

A BROADER REFORM VISION

Although the Treaty of Ghent ending the war was signed 24 December 1814, news of its existence only reached American shores in early February 1815. On 3 March, Congress passed an act establishing the peacetime army. It looked much like the 1808 army – 10,000 men of infantry and artillery, a corps of engineers, one surgeon and two mates per regiment, one judge advocate, and one chaplain per brigade. The Hospital Department was abolished once again. In May, the army was divided into two divisions, Northern commanded by General Jacob Jennings Brown, and Southern commanded by General Andrew Jackson. Tilton retired in June.

Infighting occurred among veteran medical officers – Mann, Lovell, and Benjamin Waterhouse – as they jockeyed for plum post-war urban assignments, such as Boston, that promised lucrative private practice opportunities (it was also Lovell's hometown). General Brown, however, was looking for a competent, campaign experienced physician and surgeon to be his chief medical officer. It appears that Brown's urging may have convinced Lovell to give up the struggle for Boston and remain a line medical officer. Lovell was made Northern Department Chief Medical Officer in the summer of 1816.[8]

Lovell was an excellent choice. From December 1812 through May 1815, he had directed hospitals or been on campaign. Dr. Mann commented in his post-war medical sketches that Lovell was "one of the most able and attentive surgeons in the army,' and that Lovell's "frequent reports … bespeak an accurate and discriminating mind."[16] And Dr. William E. Horner, who had worked with Lovell during the war, noted that Lovell "distinguished himself by his skill and zeal in the campaign of 1813, as well as in 1814."[17] After a personal inspection tour of the Northern Department in 1816, Brown recognized that his medical support was in complete disarray. He directed Lovell to conduct his own inspection and prepare a report of his findings. On 15 November 1817, Lovell sent *Remarks on the Sick Report of the Northern Division for the Year ending June 30th, 1817,* to Brown. The accompanying cover letter noted that the "complaints most prevalent among the troops are precisely the same as during the war; & which were then so destructive to our Army; viz: diseases of the lungs and bowels. It was therefore thought proper to state at large their probable causes, & the obvious means of preventing them; & from my own experience on the subject, I am fully convinced of the correctness of what is here advanced."[8]

Lovell's discussion began at the tactical, that is, regimental level where he indicted line and medical officers for wanton neglect of soldier welfare, vis-à-vis, appropriate clothing and quarters. As Pringle, Rush, and Tilton had advocated years earlier, disease prevention is a line and medical officer responsibility. Regimental surgeons not only had to have an adequate medical knowledge base and administrative competence but also must understand military regulations and operations to support his command appropriately. Surgeons at the operational level, Lovell wrote, had the same duties and responsibilities as regimental surgeons but with a broader scope of action. Therefore, they had to have sufficient experience which only came over time. Hence, the reason for a peacetime medical department.[8]

Lovell was adamant that these surgeons gathered, analyzed, and reported health conditions at their posts, which included geographical descriptions of the post, climate, and weather quarterly. This system of medical police would identify diseases incident to soldiers. Moreover, if new medical treatments were discovered, they were to be assessed and reported. (He supported William Beaumont's research on gastric acid in the late 1820s.)[8]

Lastly, Lovell also described a medical chain of command and a medical officer at the strategic level. This officer would have the responsibility to consolidate quarterly reports and present them to the commanding general. Also, he would be the inspector of hospitals, who would conduct inspections independently of command and inspector general visits.[8]

In March 1817, James Monroe became the fifth President of the United States. Among his first concerns was to stop what been a revolving door of war secretaries since Eustis' retirement. He selected War Hawk John C. Calhoun of South Carolina. Calhoun wrote to General Brown that "we have indeed much to do" in fixing and reorganizing all aspects of the army and asked for his opinions.[8], Brown was not shy about giving his opinions, and he sent Lovell's report to the new Secretary of War. Calhoun recognized in Lovell's words the same broad vision, the same organizational complexity,

he advocated for the medical department. Experienced physicians should be retained in service, all applicants must have a medical diploma and pass an entrance examination, and the department must have a central directing authority on the Army Commanding General's staff.[8]

On 14 April 1818, Congress approved Calhoun's reorganization plan which authorized six departments: quartermaster, commissary, ordnance, paymaster, a combined adjutant and inspector general, and medical. By the end of the month, President Monroe had selected Joseph Lovell as the first Surgeon General to sit on the Army Commanding General's staff with an office in Washington, D.C.[8] The U.S. Army Medical Department had finally become a constituent part of the army it served.

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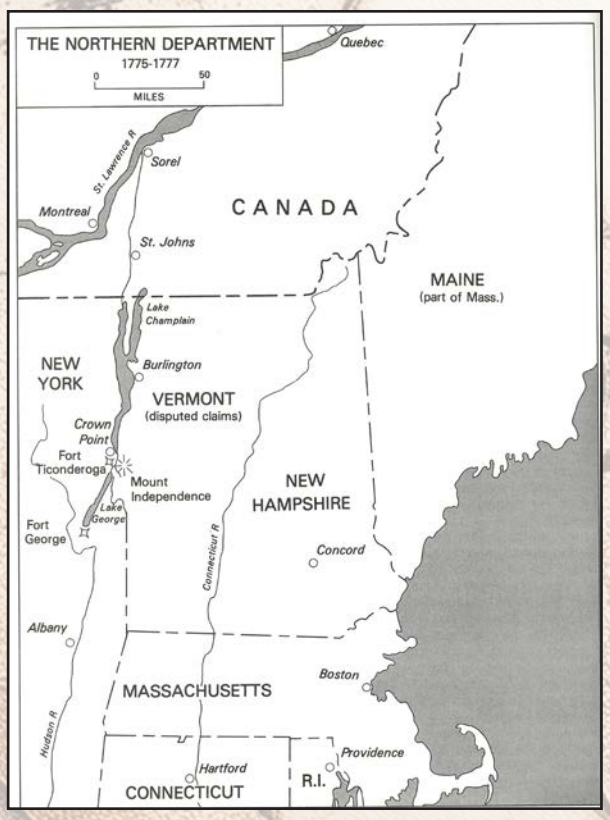
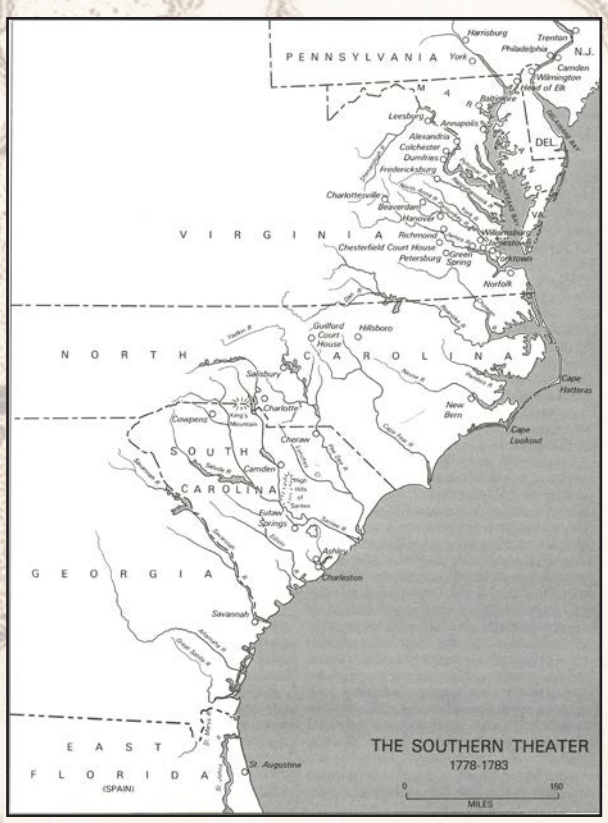
Photo Acknowledgements

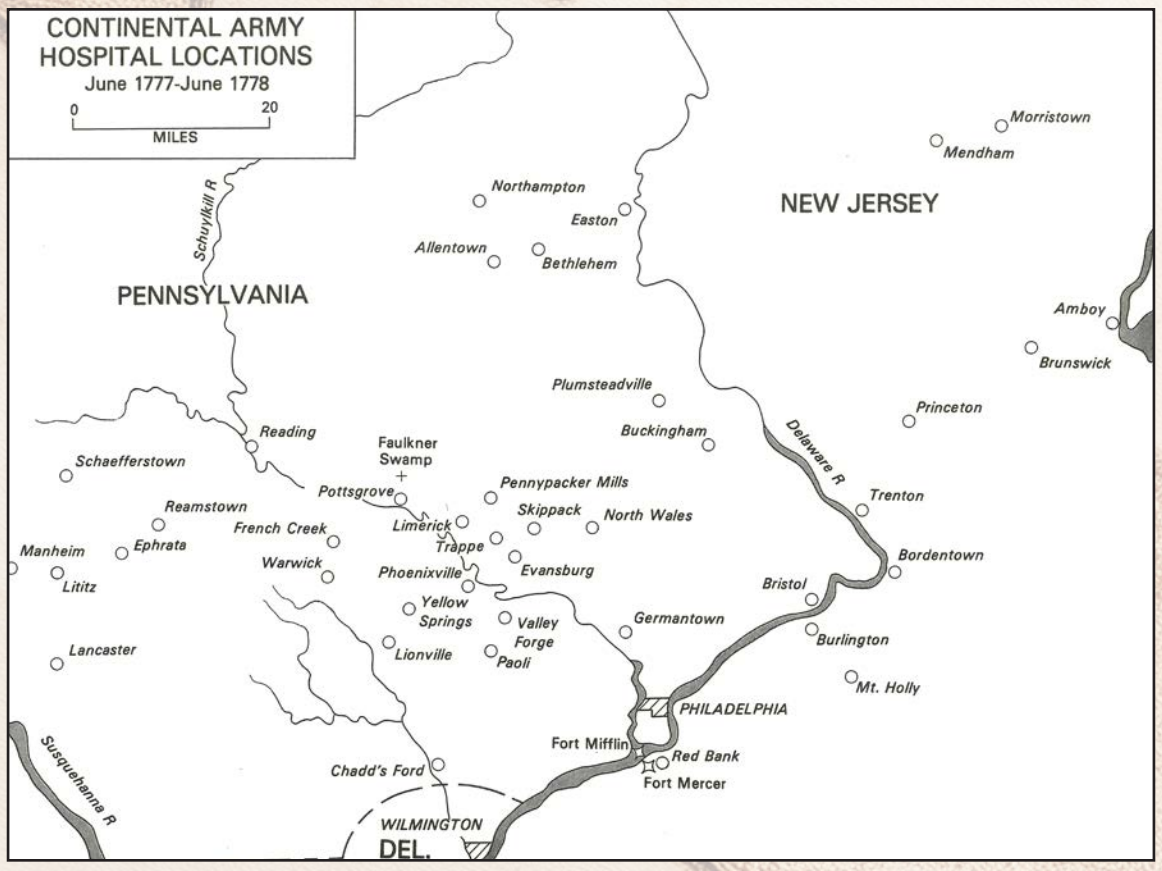
Portions of the articles feature AI generated images from ChatGPT and Adobe Firefly.

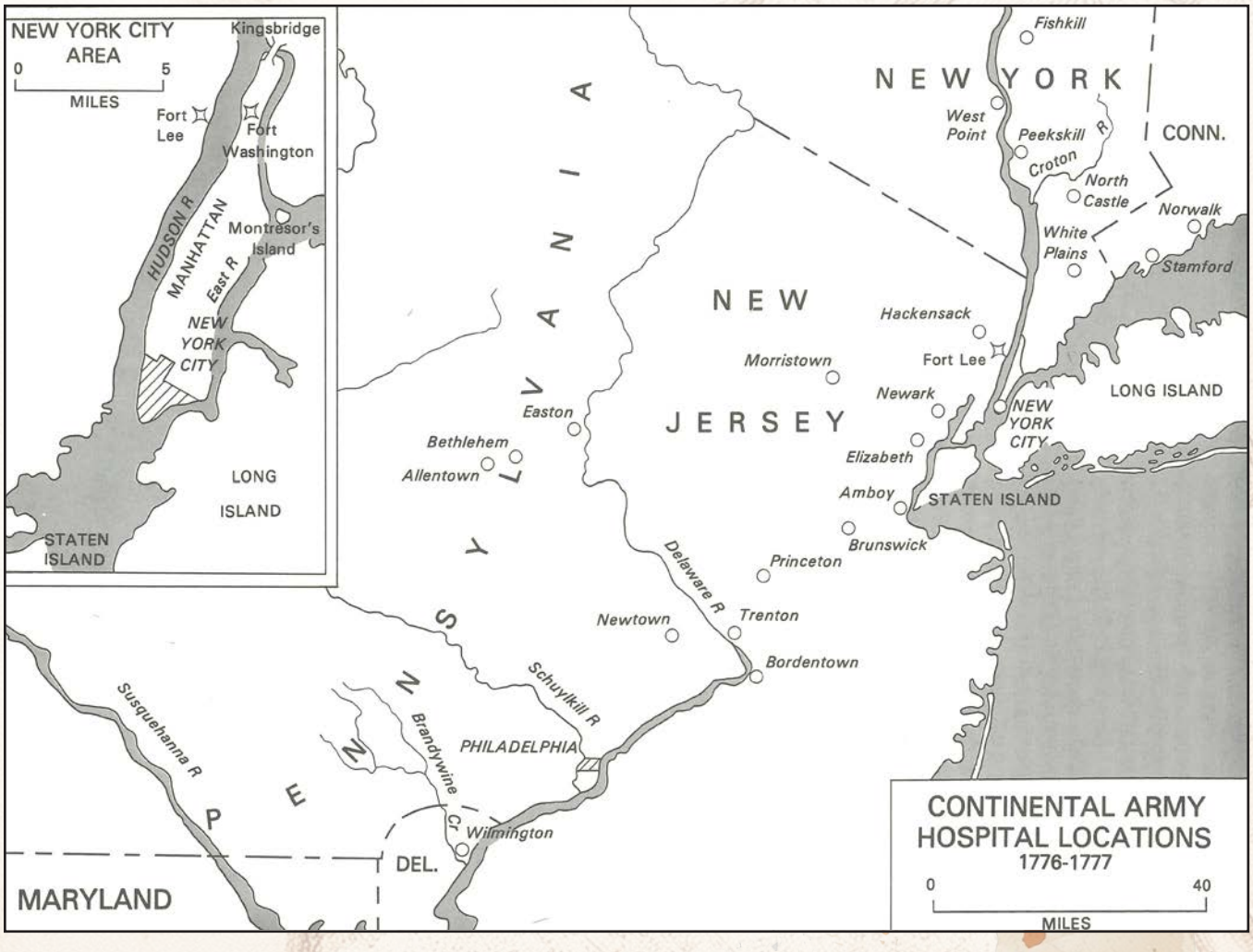
Historical photographs were taken from the source texts within the captions, and articles, or author personal phtotographs.

Appendix A: Maps








NEW YORK CITY AREA
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MILES
Kingsbridge
Fort Lee
Fort Washington
HUDSON R
MANHATTAN
East R
Montresor's Island
NEW YORK CITY
LONG ISLAND
STATEN ISLAND
PENNSYLVANIA
NEW JERSEY
NEW YORK
CONN.
Fishkill
West Point
Peekskill
Croton R
North Castle
Norwalk
White Plains
Stamford
Hackensack
Fort Lee
Morristown
Newark
LONG ISLAND
NEW YORK CITY
Easton
Bethlehem
Allentown
Elizabeth
Amboy
STATEN ISLAND
Brunswick
Princeton
Delaware R
Trenton
Newtown
Bordentown
Schuylkill R
Susquehanna R
Brandywine Cr
PHILADELPHIA
Wilmington
DEL.
MARYLAND
CONTINENTAL ARMY HOSPITAL LOCATIONS
1776-1777
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