

## FLORENCE NIGHTINGALE AND TROPICAL AND MILITARY MEDICINE

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The close relationship between Tropical Medicine and Military Medicine is little appreciated by others than those immediately concerned with the health of the forces, except when periods of emergency require the expedition of men into the warm countries. At such times the special problems in sanitation, public health, and clinical medicine achieve an unaccustomed dignity and importance, secondary only to the major strategic plans of the General Staffs. This relationship, moreover, is more than one of mutual responsibility. It is one of common origin. Sir Patrick Manson is frequently referred to as the "father of tropical medicine" because he initiated the era of clinical and scientific investigation. In point of fact both fields of medicine may be said to originate from the experiences of the British Army in the Crimea and in India in the middle of the last century. And both Tropical Medicine and Military Medicine have a common parent. It was an English lady, Florence Nightingale, who, from her own observations at Scutari and on the Crimean Peninsula, and her studies of medical reports from British Army Stations in India, devised and applied statistical methods which showed morbidity and mortality rates in true perspective. Her data demonstrated the great public health importance of several of the important tropical diseases. Her influence and her recommendations to the "Royal Commission on the State of the Army in 1857", subsequently adopted by the British Army Medical Service, constitute the basis of military medicine to-day.

France declared war on Russia March 27, and Britain March 28, 1854. The War of the Crimea which was to exert such a profound effect upon Military Medicine and sanitation had begun. In an early despatch to his paper, W. H. Russell (1) war correspondent of the London Times made the prophetic statement: "The people of England, who have looked with complacency on the reduction of expenditure in all branches of our warlike establishments, must not be surprised if they find the movements of our Army hampered by the results of our injudicious economy.—All experience forbids us to hope that soldiers can be massed together in modern days without incurring almost the certainty of an epidemic, even if they are in the most healthy climates in the world". How valid were these fears is attested by the conclusion of the fifth and final report of The Select Committee on the Army Before Sebastopol (2): "Your Committee are, however, of the opinion that this amount of unavoidable suffering has been

aggravated by causes—mainly to be attributed to dilatory and insufficient arrangements for the supply of this Army. . . .

“It appears that the sufferings of the Army resulted mainly from the circumstances in which the expedition to the Crimea was undertaken and executed. The Administration which ordered that expedition had no adequate information as to the amount of force in the Crimea or Sebastopol. They were not acquainted with the strength of the fortresses to be attacked, or with the resources of the country to be invaded. They hoped and expected that the expedition would be immediately successful, and, as they did not foresee the probability of a protracted struggle, they made no provision for a winter campaign; what was planned and undertaken without sufficient information, was conducted without sufficient care or forethought.”

What were the results of this lack of information and forethought?

On arrival at Gallipoli the Army had neither blankets for the men nor medicines for the sick—these had been left at Malta. Thence they moved to Varna, to join the Allied Army, despite almost complete lack of equipment and unorganized ration supply. Their camp was established in the “Valley of Death,” a swampy valley locally notorious for its high incidence of cholera and what we now recognize as Malaria (3). Diarrhoea became prevalent and epidemic. Cases of “low fever” occurred, and typhus was likewise present. In July of 1854 cholera appeared among the French troops, spreading from the camp into the town and exhibiting great malignancy. The French losses were heavy—from July 14 to August 9, in the General Hospital there were 720 deaths and only 78 discharged cured. The Turkish and Greek civilians in the town “died like flies.” Finally cholera spread to the fleets.

Despite the prevalence of disease and the consequent heavy loss of effectives, a landing was made on the beaches of the Crimea September 14. The battle of Alma fought September 19 to 21, although an allied success, fell short of a great victory because of exhaustion of the troops and thinning of the ranks by disease. Meanwhile cholera which had continued in sporadic form broke out again in the British Army and by September 30th. had claimed as many victims as died at the Alma.

Sebastopol was invested in early October, the British force numbering 27,865 effectives on the second of the month, of whom 6,777 were sick. The country was saturated with rain, the Army operating on reduced rations, and suffering greatly. The men’s equipment was deficient, the sanitary conditions were deplorable. Casual surface water was used indiscriminately, and even burial of the dead consisted merely of a covering of a few inches of soil. Throughout the autumn of 1854 and the winter of 1855 there was a heavy toll from disease. “Fever,” diarrhea, and dysentery were rife. In late November a severe outbreak of cholera began—“we cannot estimate the number of deaths from it,” a witness remarked (2). By early February the deaths from disease alone among the British troops in the Crimea were estimated at 4,300. Scurvy was prevalent throughout this period. During the cold weather typhus and small-pox became prevalent, and in the spring, typhoid, malaria, dysentery, diarrhea, and cholera reappeared.

From December 1, 1854 to January 20, 1855, 8000 sick were carried from the camp before Sebastopol, to the base at Balaclava where appalling conditions prevailed. "As to the town itself, words can not describe its filth, its horrors, its hospitals, its burials, its dead and dying turks, its crowded lanes, its noisome sheds, its beastly purlieus or its decay. . . . In spite of all our efforts, the dying Turks have made of every lane and street a cloaca . . . Raise up the piece of matting or coarse rug which hangs across the doorway of some miserable house . . . . The dead, laid out as they died, are lying side by side with the living, and the latter present a spectacle beyond all imagination. The commonest accessories of a hospital are wanting; there is not the least attention paid to decency or cleanliness—the stench is appalling. . . . The sick appear to be tended by the sick and the dying by the dying. . . . The mortality among the Turks has now assumed all the dimensions of a plague" (1).

The sick and wounded arriving here for embarkation for the hospitals on the Bosphorous were usually without kit or blankets and frequently soaked with rain from hours of exposure in native carts or strapped to the backs of mules. They were loaded on transports which were both unsuitable and unequipped, in some instances even without medicines. Sick and wounded were placed indiscriminately on the decks, so crowded that it was often impossible to get near them. Many of them not already sick developed dysentery. Many died and were thrown overboard; many others on arrival at Scutari were dying and unable to tell their names or their regiments. Although accurate records were not kept, it was estimated that 13,000 sick were embarked of whom 8 per cent died in the course of an average stay of eight and a half days on shipboard (4).

The principal hospitals of the British Army, four in number were at Scutari. These were little better than pest-houses. Cholera and typhus were rife. Fifty per cent of the dysentery cases were dying and in February of 1855 the general mortality was 42 per cent. Many individuals evacuated from the Crimea for frost-bite, scurvy, or "fever," recovered from these conditions only to die from typhus, cholera, or dysentery acquired in the hospitals (5). The Crimean correspondent of the London Times commented in March 1855: "It is strange we get so few convalescents from Scutari. The hospitals there seem to swallow up the sick forever. Of all the guardsmen who were sent down there to recover from disease or wounds, not more than sixty or seventy we are told, are in such a state of convalescence at the present moment as to permit them to join their regiments and do duty once more" (1). In January of this year the principal causes of hospital admission were "diarrhea," dysentery, frost-bite, and scurvy. The mortality rate from acute and chronic dysentery was 78 per cent (4).

The hospitals were crowded. In the Barrack Hospital the sick were laid side by side, scarcely eighteen inches apart, on straw mattresses placed upon the floor, leaving room for two persons only to pass each other between the ends of the mattresses. There were four miles of patients so disposed. "Such crowding together . . . was inevitably the cause of great mortality. But the evil was still further increased by the complete neglect of all hygienic care. There was no possibility of changing the air of the wards but by opening the windows, and this

they were afraid to do. It is impossible to describe the state of the atmosphere in the wards, particularly during the night. The air was vitiated in the highest degree—there was no drainage for the water and filth—no possibility of escaping the horrid smell from the privies which filled the passage and entered the wards. The floors were always wet and saturated with filth—the walls and ceilings were also saturated with putrid animal matter; rats and vermin swarmed everywhere, and as there were no night vessels large tubs were placed in the wards to supply this deficiency” (3).

There was an absolute deficiency of equipment, even blankets, furniture, and utensils. The kitchens were inadequate. The staff insufficient, and there was a total lack of any scheme of hospital organization. It is not to be wondered at that both cholera and typhus broke out repeatedly among the sick and the well, or that the deaths in hospitals approximated 4,600 (6).

It early became evident that something was amiss in the hospitals and Sidney Herbert, Secretary at War, was largely, if not entirely responsible for the des-

TABLE 1  
*Hospital admissions January 1, 1855*

	ADMISSION	DEATHS	MORTALITY RATE
			<i>per cent</i>
Acute dysentery.....	865	210	} 78
Chronic dysentery.....	143	578	
Scorbutic dysentery.....	181	44	
Diarrhea.....	4191	1199	
Acute rheumatism.....	342	58	
Chronic rheumatism.....	84	9	
Frost-bite.....	1413	124	
Scorbutus.....	542	31	

patch of Florence Nightingale with 24 women nurses, to Scutari (7). They arrived in November 1854 and Miss Nightingale immediately instituted fundamental sanitary reforms. She promptly recognized, however, that the basic problems lay in an ineffective organization, administrative difficulties, and a seriously deficient system of supply. Through her insistence Lord Panmure, Secretary for War, sent out a Sanitary Commission in February 1855. This Commission instituted sweeping reforms, based largely upon Miss Nightingale's recommendations which resulted in a marked fall of the death rate. Prior to these changes the mortality rate in the Scutari hospitals was 315 per 1000; following them it fell to 22 per 1000 (4). In the last six months of the war the mortality among the sick was not much more than among the healthy guards at home, and in the last five months only two-thirds of the rate among troops at home.

In August of 1856 Miss Nightingale was received by the Queen. Shortly thereafter Lord Palmerston the Prime Minister, and Lord Panmure requested that she submit a written report of her observations at Scutari and in the Crimea

and that she embody in it recommendations concerning necessary reforms in the Army Medical Corps. This report, and her subsequent efforts were directly instrumental in the appointment of the Royal Commission on the State of the Army under the Chairmanship of Sidney Herbert. She played a further important role in the selection of the personnel of the Commission, the scope of its investigation, and the preparation of its agenda. Her testimony as a witness before the Commission was vital and conclusive. She attributed the excessive sickness and mortality to three major factors: "The Army was ill-provided in the Crimea and disease was generated there". "The sick transports were in a state fatal to the sick and absolutely unhealthy for all . . ." "The sanitary state of the hospitals at Scutari was such that the sick had not a chance" (4). She further pointed out: "There is nothing in the education of the Medical officer—nothing in the organization of powers of the Army Medical Department—nothing in the whole hospital procedure—nothing in the Army Regulations which would have met the case of these hospitals". She showed likewise that the peace time mortality rate of the Army at home far exceeded the civil rates.

TABLE 2

*Mortality rates per 1000 per annum (same age groups civil and military)*

Army at home stations.....	17.5
Civil population England and Wales	
Rural.....	7.7
General.....	9.2
Civil population St. Pancras, London.....	2.2
Civil population Manchester and Liverpool.....	12.4

Miss Nightingale was insistent that sweeping reforms of the Army Medical Department were imperative including the establishment of an Army Medical School. The Royal Commission in its report adopted and confirmed her evidence, her conclusions, and to a large extent her recommendations. The findings of this Commission were so significant and important politically that four sub-commissions, each under the chairmanship of Sidney Herbert were appointed to carry out the recommendations of the parent body.

The first of these, concerned with sanitation of barracks, brought about improved heating, ventilation, drainage, water supply, and kitchens.

The second was commissioned to organize a Statistical Department. When its suggestions were carried out the British Army statistics became the best and most useful then obtainable.

The third was instructed to institute an Army Medical School. This was one of Miss Nightingale's major interests and she and Sir James Clarke were commissioned to draw up the regulations, while to her was delegated the nomination of the professional staff. The Army Medical School was opened in 1860.

The fourth sub-commission was entrusted with the general reorganization of the Medical establishment. Its efforts led to the promulgation of a warrant for the promotion of Medical Officers in 1858, and reorganization of the Army

Medical Department in 1859. Even more important, it drew up a code for the introduction of sanitation in the Army, defining the position of Commanding and Medical Officers and their respective duties regarding the soldiers' health, and constituting the regimental surgeon the sanitary advisor of his commanding officer. And finally, it issued new regulations for general and regimental hospitals.

These reforms produced immediate results. In the three years 1859-60-61, the mortality rate of newly enlisted men at home stations was reduced 50 per cent; the total mortality at home stations from all diseases was reduced below the former mortality rate for chest diseases alone; and the mortality of the China expedition including wounded was little more than 3 per cent per annum.

Meanwhile Miss Nightingale became concerned about the health of the Army in India (8). She emphasized that the causes of camp diseases were primarily due to bad sanitary conditions. The hospitals were open to the same criticisms that had been directed against those in Scutari. And she pointed out: "Our experience at home as to the results of sanitary improvement on the health of the Army affords every reason to expect a very great improvement in the health of the Indian Army, if proper sanitary measures be carried out."

In 1859 Queen Victoria appointed a Royal Commission on the Sanitary State of the Army in India. At the request of the Commissioners Miss Nightingale prepared a questionnaire which was sent to every Military Station in India. The returns she subjected to statistical analysis. The report of the Commissioners states: "Appended to the report . . . (is) an abstract of all the stational reports, and a valuable paper of comments on these reports, contributed, at the request of the Commission by Miss Nightingale" (9). The recommendations of the Commission included extensive sanitary improvements, hospital reforms, and approval of ". . . Medical candidates being required to undergo the course of instruction, including Military hygiene, at the Army Medical School, and are of opinion that practical training in sanitary science is of the greatest importance to the public service."

The effects of the application of the recommendations of this Commission were no less striking than those obtained in home stations. A witness had testified that the mortality among British troops in India varied between 30 and 70 per 1000. By 1874 the mortality had been reduced to 18 per 1000.

A corollary of Miss Nightingale's efforts in behalf of the health of the Army was her contribution to Medical statistics. In the Crimean War there was no uniform plan for hospital records, and each hospital adopted its own nomenclature and classification of diseases. With the assistance of Dr. Farr of the Registrar General's Office she prepared a standard list of diseases, and model hospital statistical forms which were approved by the International Statistical Congress in London in 1860. It is of peculiar interest to us that, upon request, she sent to the Secretary of War in Washington these war office forms and reports with the suggestion that since the United States had adopted the British

Registrar General's nomenclature, the British Army Statistical Forms be adopted as well.

Shrimpton (3), a surgeon major in the French Army, writing in 1864 of the Crimean Campaign said: . . . "the prolongation of this war, with its enormous sacrifice of money and men, was the result of sickness, quite independent of the effects of the war itself, and that as regards the British Army in particular, its soldiers would have been almost entirely exempt from the diseases to which they became a prey, if, from the beginning of the Campaign, they had been accompanied by a good military administration." This was the product of the system then in effect. The young Medical Officer received no special training upon induction into the Service. Much of his career was spent in small out-of-the-way posts where educational experience was negligible if not entirely wanting. His medical responsibilities and opportunities paralleled his rank. Intellectual stagnation was the inevitable result, and ultimately he became a purely administrative officer, useless professionally. It was said "The Medical Department of the British Army does not at present, as a body, hold that professional standing which might justly be expected in a country where the civil medical profession takes so high a rank. . . . I therefore contend that in no other country a Military Medical School is as necessary as in England" (5).

Miss Nightingale's contributions to military medicine are many and of the utmost importance. To her is due recognition of the principle, then not even considered, that the Army Medical Department should care for the health as well as the sickness of the soldier. She demonstrated that many of the diseases and much of the mortality of the Crimea were preventable. She herself stated "you cannot improvise the sanitary care of an Army in the field." She brought about fundamental and permanent changes in the organization of the Army Medical Department and the military hospitals and barracks. And she made provision for the establishment of formal education in military medicine. From the Crimea dates the first serious and sustained movement for the application of sanitary science in the British Army.

Although, less spectacular perhaps, her contributions to present day tropical medicine are no less important. She demonstrated that such diseases as cholera, typhus, dysentery, and typhoid, are limited not by geography but by sanitation. Her acquaintance with and representations to Sir John Lawrence, Viceroy of India were instrumental in the proof that such diseases are preventable in normal times in the tropics just as they were in war-time in the Crimea and in the hospitals of Scutari. These observations antedating the discovery of infectious agents and their relation to disease constitute an important milestone in the history of tropical medicine. They likewise constitute the foundation upon which one of the most important functions of Tropical Medicine is based—preventive medicine in the Tropics.

An English lady, Florence Nightingale, first brought together the partners—Military Medicine and Tropical Medicine; to-day national emergency is bringing them together again.

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