

Medical Services and Military Medicine during the Anglo-Zulu war of 1879. Part 1.

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Introduction

The Anglo-Zulu war of 1879 coincided with the mid-point of an era signifying important changes in the organisation of medical services and delivery of military medicine. During this period, the desperate need for an improved service within both the British army and naval medical establishments, resulted in an evolution. This began with major reforms in the late 1850s, which continued through a long transition period to the Boer war in 1899 and beyond. The changes commenced with the establishment of improved living conditions in the British army and recognition of the need to elevate the standard and delivery of healthcare to the common soldier. This aimed to ensure a higher average standard of fitness and improve the recovery rate among the sick and wounded, especially during Foreign Service. However, the conflicts in South Africa during the late 1870s would test the limits of the medical services in terms of organisation, manpower, efficiency and improvisation.

The military medical service was never an attractive proposition, except to the desperate or adventurous minority and for good reason. The status of medical officers began as generally second class soldiers of position within the military establishment, during the mid-nineteenth century. Eventually, with reforms, the dawn of the twentieth century would herald a new beginning, in terms of the importance and recognition of medical officers within the army and navy. The Ninth Frontier war in South Africa signalled the beginning of relentless conflict, of varying degrees, in the region against different tribes. From September 1877 to December 1879, the British colonial administration fought a series of small wars, battling the Galekas, Gaikas, Griquas, Zulus, Basutos and finally, the Pedi. Both the Ninth Frontier and Anglo-Zulu wars challenged the organisation and efficiency of the British army and naval medical services. The Army Medical Department felt the stress, and ultimately the strain, of the demands of war, particularly in Zululand. The Zulus were initially underestimated by an overconfident British High Command in South Africa, who dragged Britain into the greatest conflict since the Crimean War.

Nineteenth century military medicine and mortality

Medicine in the mid-nineteenth century began to experience a series of major advancements, that accelerated in pace with scientific discoveries and improved treatment standards. This ultimately resulted in the medical care to which, we have become accustomed. By 1879, men such as Jenner, Lister, Pasteur and others had made significant contributions, with improvements in the areas of hygiene and sanitation. However, a real understanding of the aetiology or cause of diseases, with few exceptions, continued to elude the medical profession. The microscope had been invented but the full potential of this revolutionary instrument had yet to be realised. The minute dots and rods seen under high-powered magnification were interpreted as the body's healing process along with an abundance of white cells and it was not until 1882 that Koch discovered that micro-organisms were responsible for many diseases.

In the 1870s, the medical profession still considered that all maladies were classified under the headings of miasmatic and nonmiasmatic diseases. Miasma was considered to be a poisonous vapour or mist, filled with particles from unhealthy soil and decomposed matter (miasmata) that caused illnesses. The miasma concept, also called the miasmatic theory, recognized a noxious form of bad air, which was identifiable by its foul smell. This bad or mal air, when encountered in the tropics became known as malaria, which today we know to be a specific disease spread by the anopheles mosquito. Due to the predominance of the miasma theory, the 1854 discovery by Filippo Pacini of the parasitic micro organism that caused the disease was completely ignored. The result was that the miasmatic theory would prevail for another 30 years, until Koch was able to prove the true aetiology. On the other hand, miasmatic theory seemed to make perfect sense as it made the connection between poor sanitation and sickness such as cholera, which led to sanitary reforms and the successful fight against the disease.

The military attributed the cause for camp fever or crowd poisoning, to miasma which caused febrile type of diseases, all divided into three fever causing groups, known as intermittent or paroxysmal, continued and eruptive. Typhoid or enteric fever, cholera, typhus, dysentery and smallpox were considered miasmatic in origin. All treatment would attempt to rid the body of its infectious poisons. Fresh air was advocated, together with a dose of cathartics, to flush out the intestines and diaphoretics, to perspire the toxins away. Nonmiasmatic diseases were classified as either constitutional or local in nature. Rheumatism, venereal disease, tuberculosis, scrofula, scurvy, purpura and anaemia were all considered as constitutional in origin, while local diseases included afflictions of the eye, ear, respiratory tract, urinogenital tract, kidneys, heart, nervous, lymphatic and digestive systems. Some conditions such as nostalgia, debility, morbid depression, tetanus and scabies were unclassified as diseases.

To explain the spread of contagious or infectious diseases, some in the medical profession believed in the zymotic theory which involved a fermentation process to propagate certain diseases. Zyme or microzyme was the name of the germ presumed to be the cause of zymotic diseases which included typhus and typhoid fevers, smallpox, scarlet fever, measles, erysipelas, cholera, whooping cough and diphtheria, amongst other diseases. Once the science of bacteriology became fully recognized then the term zymotic fell out of use.

While medicine improved health, the improvement tended to be slow. Unfortunately, the theory-based medicines, predominantly cookbook therapies used by physicians, were mostly all but useless and even harmful at times. The dictates of medical dogmatic thinking, smothered any proposed theory that unseen invaders might be the villains behind disease. A bullet or Zulu spear posed considerably less danger than the onset of inflammation, symptoms of heat, redness, swelling, pain and diarrhoea. Disease prevention, was really hope of avoiding a death-dealing illness and with regard to surgical treatment, pain was accepted as a necessary consequence. Although general anaesthetics were available in 1879, their use was not universally deemed necessary by the military medical departments. More medical and surgical advances such as diagnostic techniques, anti-microbial drugs and radiography would occur, but they had to wait until the Anglo-Zulu war was over. With a few exceptions, proper prevention and treatment were still hampered by ignorance and concepts which simply kept medicine and disease in the dark ages. Diet, disease, social conditions all contributed to a generally poor average state of health of the recruits in the years leading to the Anglo Zulu War.

Applied medicine and surgery are considered hand in hand, as the two disciplines constantly overlap. Military surgeons tended to think that the treatment was to deal with the immediate problem and not the whole patient, or the entire case management. Delivery of advanced and first class medical and surgical care to any group or individual does not necessarily produce the desired result. Rehabilitation and invalid care assist in the recovery and long term conclusion or consequence of the sciences provided. Pure medicine as practised by physicians is defined as the science of preventing, treating or curing disease. It can also be accurately described as any substance used to treat or prevent disease or illness. Surgery or surgical care is provided by medical practitioners in the treatment of diseases or injuries by manual or instrumental operations. Physicians and surgeons have always been considered as two different disciplines. Military medical officers were expected to demonstrate competency and skill in wearing both the physician's cap and the surgeon's gown.

In the years following the Napoleonic wars, the British army became engaged entirely in policing an expanding empire and, with no European wars for the next forty years the military establishment was not prepared for what lay ahead. The experience of the Crimean war exposed many problems which had resulted from administrative and operational chaos. The whole impression of military medicine up to 1854 was one of improvisation and compromise and of failing to prepare for an emergency. The medical services suffered from every imaginable handicap despite the best efforts of many medical officers to deliver the best available care to the many sick and wounded soldiers. Disease accounted for 93% of all hospital admissions and 60% of all deaths in the British army during the conflict in the Crimea.

Army life in the British army at home in the mid-19th century carried increased risks of mortality. The ratio of medical officers to servicemen in the 1870s was approximately 1 per 204, which compared very favourably to the civilian sector, where the figure was 1 per 1672. However, this apparent advantage did not always result in better health in the army. Statistics compiled in 1858, concluded that the chances of dying was 16.2 per 1000 or 50% higher in the army while stationed in England among 20-29 year-old men compared with their contemporaries in civilian life. Servicemen between the ages of 30-39 experienced a mortality rate of 14.4 per 1000, or 31.5% higher than their civilian contemporaries. On campaign, the divide became greater due to the change in climate, living conditions and exposure to

unfamiliar disease especially in the tropics and increased injuries from accidents and death in combat. The mortality rate among military medical officers in the British army, averaged 30 per annum in the period 1850-79, though more significant statistically, the chances of death in this group was 44% greater than males in civilian life and 75% greater than civilian medical personnel. Surprisingly, the chief mortality was not among the older medical officers as in civilian life but in younger individuals.

By 1875, with improvements in army life conditions, the death rate among soldiers stationed at home had fallen to 5.6 per 1000 among 20-29 age groups while the figure remained at 14% among those aged 30-39. The gap in mortality rates compared to the civilian male population, had not only narrowed considerably in the two decades, soldiers in the 20-29 age group actually experienced a lower death rate. This was most likely also influenced by the fall in the socio-economic conditions and deterioration in general health, among the poor classes. Obviously, progress in the quality and quantity of food, clothing, shelter, better personal hygiene and barrack sanitation played important roles in improving the circumstances of the average soldier.

In 1879 the British army was embroiled in the largest military undertaking since the Crimean war and the efficiency of the improved medical services would soon be tested. Under a new system, Chelmsford's military surgeons needed to prepare for changes in circumstances and the possibility of promulgated or extended campaigning, beyond the expected quick and jubilant victory. However, history would repeat itself once again, in the conflict in Zululand, where disease was to cause more hospital admissions than death and wounds from combat.

HEALTH, DISEASE AND THE SOUTH AFRICAN EXPERIENCE

South Africa is considered as a subtropical location, moderated by ocean on three sides of the country and the altitude of the interior plateau. These factors account for the warm temperate conditions. While the Western Cape receives most of its precipitation in winter, the rest of the country is generally a summer rainfall region. In theory, the Cape as a stopover for troops during long voyages might be considered viable. Indeed, the question of whether or not to use the area to acclimatise soldiers, for two or three years prior to foreign service in India and as a place for convalescents, after living in malarious countries, was considered by the War Office, but never put into place. Evidence was available that experiencing the salubrity of the Cape was beneficial for the acclimatisation of troops on their way to India and the recovery of soldiers after Foreign Service elsewhere. In truth, South Africa posed a variety of medical challenges, which while not quite as threatening to the health and welfare of the common soldier, as compared to the Indian subcontinent, still accounted for one of the highest morbidity and mortality rates in Foreign Service locations.

Every soldier serving in South Africa was subjected to the same health risks. His response to disease somewhat depended on his general state of fitness upon arrival and subsequent activity in the area. The average recruit in the 1870s was not a healthy specimen compared to those of the previous decade. In the United Kingdom most people lived in an environment of ill-health and rampant disease, in part associated with the poor diet and unbearable living and work conditions. The young men of the 90% of British army recruits, coming from the working classes, had grown up in squalor or wretchedness. As infant mortality was high and general life expectancy low, they were fortunate to have survived childhood diseases. Poor agricultural yields during most of the 1870s together with industrial decline and increased unemployment, created further poverty, this ultimately caused an increase in sickness and mortality rates, in the general population. The effect upon recruitment standards was a significant decline in minimum requirements as the minimum height was dropped to 5 feet 3 inches among the lean recruits. The average height and weight of recruits in 1878 was 5 feet 5 ½ inches and under 135 pounds respectively, with a literacy rate of 74.4%. The British army had for many years following the Crimean war, suffered from recruitment problems, where supply had not matched the demand for men. The change in the socio-economic circumstances in the United Kingdom during the 1870s altered that imbalance to the extent that by 1877, the number of recruits had peaked at 30,966 that year. In 1878, of 43,867 applicants, 13,091 or 29.8% were declared unfit and rejected by the medical examiners.

Conflict in the late 1870s was almost continuous, as somewhere in the region hostilities with various defiant tribes kept the colonial administration constantly busy. Upon arrival in South Africa, soldiers soon learned to contend with unfamiliar hazards of life peculiar to the Cape, particularly on campaign. Firstly, there was the tough and often unmapped terrain, along with the hot climate and seasonal unremitting rain, for which the uniforms and protective clothing were unsuited. Heatstroke from the sun, dehydration, poor

personal hygiene and the exposure to invasive parasites, lice, insect bites, ticks, flies; in particular mosquitoes and the risk of snakebites were everyday concerns for the troops. In addition to these dangers, the heavy wear and tear on the body soon became an accepted, though miserable part of campaign life. Natal sores caused by aggressive ticks plagued the soldiers with ulcers and infections, to the extent that many were invalidated. Foot sores, blisters and worn out footwear caused by long and arduous marches were also part of the experience. The quality of food and water was often questionable and the poor living conditions in overcrowded camps with inadequate sanitation, predisposed to sickness and development of epidemics among the troops. The poor understanding of disease aetiology, prevention and treatment simply allowed disease to proliferate and debilitate. The scale of infection by intestinal worms, in particular tapeworms, reached epidemic levels, to the extent that 50% of all white residents in Natal were considered to be plagued by the parasite.

Campaigning in the region, particularly in Zululand, came with few comforts and the health of troops was heavily influenced by the local climate and physical geography. These factors weighed heavily in determining the susceptibility of the troops to diseases, depending on their location and time of the year. The differences in medical challenges faced by the medical officers in the coastal belt of Zululand in 1879, was a marked contrast compared to the interior areas, which were not considered as high risk for malaria and other diseases. In preparation for the invasion of Zululand, Surgeon-Major N. Alcock's report in September 1878, compared and contrasted the area to Natal, in terms of the climate and the incidence of diseases. He believed that beyond 15 miles from the coastal area, there was less risk of serious diseases and that the highlands posed little risk, compared to the valleys. Miasma, carried by the winds from the swamps in the St Lucia Bay area, was considered responsible for the higher risk of malaria and dysentery in the coastal area, to a greater extent, compared to the coastal area in Natal. In the weeks leading up to the invasion, cases of sickness requiring hospitalisation, began to increase among the Regulars and men of the Naval Brigade who had been stationed west of the Lower Tugela, since landing on 15 November 1878. Staff Surgeon James Norbury reported on 1 January 1879, that he had already attended to a number of cases of malaria, diarrhoea and various gastrointestinal complaints, notwithstanding the fact, that the encampment had been carefully chosen with all proper sanitary precautions and acted upon. Norbury attributed the cause as contact with miasmatic sources in the marsh area surrounding the river.

The worst period for sickness was from February to end of May, both in this area and in the interior. Alcock considered the greatest risks as tapeworm, dysentery and rheumatism. As long as soldiers avoided camping in the disease infested valleys of the interior, he believed that they were reasonably safe from serious diseases. There, he reported that the water was categorized as brackish and likely to be contaminated by animal droppings, which would account for the high incidence of tapeworms. He did get a grasp of the potential medical problems that would follow an invasion of Zululand and made certain recommendations with regard to sanitation, which would help reduce the risk of disease in 1879. These preventive measures included camping on high ground and preferably in tents. The use of cholera belts as a way of preventing dysentery was universal among the troops. Such was the faith in the use of cholera belts by the medical officers, that each regiment was issued two belts for each man on the roll. The consumption of hot cocoa at night and coffee early in the morning, was encouraged as a precaution against disease risk. Although bacteria were yet to be officially discovered, the soldiers were encouraged to fill their water bottles with boiled water, as observers noted that this somehow helped prevent disease. To avoid tapeworm, meat needed to be cooked well and the consumption of tapeworm-carrying animal organs, was to be avoided. Another sensible recommendation was the drinking of rain water when possible, by constructing collection funnels.

The year 1878, was a most challenging period for the British soldiers stationed and campaigning in the Cape, as the sickness and mortality rates resulting from febrile diseases increased substantially, for no obvious reason. During the period 1869-77, average annual admissions to hospital in this disease group, had been 95 per 1000 soldiers, with a death rate of 8 per 1000. In 1878 the admission rate was 136 per 1000, with the number of deaths leaping to 68 per 1000. On the other hand, the admissions and deaths in the constitutional group fell in 1878, by 20% and 44% respectively. Campaigning in 1878 would take its toll, though by keeping men in the field, it did reduce the number of syphilis cases, thereby bringing down the number of deaths by 40% from the disease, compared to the average for the years 1869-77. The increased sickness in the field was invariably determined to be caused by poor sanitation and filthy conditions among the natives and camp followers. In general, the British held a low regard for the native hygiene and habits, to the extent that they would be blamed repeatedly for all contagion and most sickness

in the camps. However, there were those enlightened medical officers who did not quite share this opinion and sought to make this known in their reports.

The total number of recorded hospital admissions among the imperial troops during 1878 was 5213, which almost equalled the total fighting strength of 5448, with an average daily sick rate of 4.8%. Admissions for diseases in the febrile group, increased by 43% with a mortality rate increase of 850%, compared to the annual averages during the preceding ten years. While the total hospital admissions in the British army stationed in South Africa had remained almost constant during the period 1868-78, the mortality rate for all diseases combined, had doubled in 1878. The marked increase in deaths was attributed to the 1878 epidemic of malaria and enteric or typhoid fever, which repeated itself the following year. Enteric fever is an acute and highly infectious disease, caused by a bacillus (*Salmonella typhi*), which is transmitted chiefly by contaminated food and water. It is characterised by high fever, headache, coughing, intestinal haemorrhaging and rose-coloured spots on the skin. While the hospital admission in 1878 doubled, in the typho-malarial category of the febrile disease group, deaths increased by 130%, compared to the previous ten years. The Principal Medical Officer, Surgeon-General J. A. Woolfryes, noted that the epidemic occurred simultaneously in the towns and among the troops on campaign. Such was his indignation that he called the problem '*a bastard form of fever*' and was convinced that the filthy habits of native troops and camp followers with the Imperial forces in the Transkei and Ciskei were to blame. The Ninth Frontier war did produce other notable medical statistics, consistent with extended campaign life. Cases of syphilis, urinary and ophthalmic diseases decreased significantly while tuberculosis, rheumatism, respiratory, cardiac and digestive diseases, took increased tolls. Interestingly, hospital admission rates and deaths in 1878, among the serving Imperial officers, was less than half in both groups, compared to the enlisted men, which most likely reflected the higher standards in living conditions. Furthermore, to add insult to injury, officers were eight times more likely to be sent back to England as invalids, compared to enlisted men.

Unlike the demands of military medicine at home, the challenges of dealing with complicated tropical diseases in foreign stations such as South Africa, kept the medical officers constantly busy and even pushed them to excel. They were expected to perform general and special procedures, especially in the absence of specialists, which were a rarity in the army. Competency in dealing with eye or ophthalmic problems was necessary and this was as close to specialised work, that the military surgeons were to undertake. During the Ninth Frontier war, there were twice as many deaths among the imperial and colonial forces, from non-combat related problems, compared to those caused by the fighting. Ensuring the quality of water supply was essential, particularly on campaign. Medical officers might be required to analyse water to determine potability, including the detection of poisons and, if necessary, take measures to improve the quality for human consumption. Other duties included sanitation arrangements and supervision of the construction of suitable structures to aid the process. A desire to improve scientific knowledge and take advantage of opportunities to facilitate the delivery of healthcare was also expected. The lack of specialists in the military was reflective of the general situation in medicine throughout Queen Victoria's reign. As contemporary medical knowledge still languished in the doldrums, specialised healthcare in the civilian world across the United Kingdom developed slowly through the establishment of hospitals and institutions by practitioners, dedicated to serve patients afflicted with specific diseases.

Prevention of medical and fitness problems on the part of caring and concerned senior combat officers, aware of the devastation that sickness and disease could inflict on the fighting strength, was essential, though usually almost non-existent. As an exceptional commander in this regard, Colonel Evelyn Wood noted that equipping the battalion under his command during the 1878 campaign "left much to be desired" and he thought that the officers were just as ignorant of the necessities for the soldiers as the War Office. He advocated the need for good boots and suitable shirts to maintain soldiers' efficiency. Such was his concern for their wellbeing, that he personally bought flannel shirts for his men at a cost of twelve shillings each. These were considered better than the cotton shirts that the men were issued for service, the use of which resulted in the increased incidence of fever, where the average 75 degrees Fahrenheit at noon, would drop 45 degrees at night. Throughout the campaign in Zululand, Wood would personally continue to involve himself in promoting optimal health and welfare among the men under his command. His concern for the soldiers during the 1878-79 campaigns resulted from his disappointing experiences from the medical point of view. He believed that the medical system had taken a step backwards and was not matching the standards and feats set five years earlier during the Ashanti expedition. During that campaign, the organisation of the sanitary and medical arrangements was considered as excellent and had clearly demonstrated a great advance in medical service efficiency, following the Crimean War. Despite the first

class performance by the medical services, including the transportation of the sick and wounded through 150 miles of dense forests, that campaign was short, unlike what was to follow in 1879.

Organisation and preparation for war

Although Chelmsford anticipated a speedy and satisfactory resolution to the forthcoming campaign in Zululand, without doubt, both he and the Principal Medical Officer, Surgeon-General J.A. Woolfryes, aimed to prevent a reoccurrence of the litany of problems associated with the medical services experienced during the recent Frontier war, in 1877-78. The want of adequate and sufficient numbers of personnel had been acutely felt, from the beginning of that campaign. Initially, there were only two military surgeons available for service with the army apart from six others stationed elsewhere in the Cape. The Colonial Office allocated three more medical officers and four civilian volunteers were recruited locally, which somewhat eased the shortage. The civil medical practitioners lacked the necessary experience needed for military medical service, which was a considerable drawback in many respects. They were not used to military discipline and definitely untrained in army administration and duties. Consequently, they were sent to the field, leaving the responsibility of the stationary hospitals in the hands of the military medical officers. Without designated sanitation officers due to the manpower shortages, the military surgeons were made responsible for the sanitary condition of their camps. The immediate need for more medical personnel was theoretically alleviated by the arrival of 17 civil surgeons in South Africa on 24 June 1878, though at the end of the conflict and too late to be of adequate assistance.

The acute shortage of medical officers was overshadowed by an inefficient ambulance service and the lack of support from the Army Hospital Corps. The corps was unable to provide suitable numbers of personnel, to the extent that a number of field hospitals had none to perform the necessary duties. Regimental bearers were difficult to obtain, due to the limited available resources. The use of natives recruited from the Fingoes and Gaikas, was repeatedly a disappointment, in that most were unreliable and desertions were common. Although the frontline units were already stretched, a few men were pulled from the ranks and assigned bearer duties.

Furthermore, the dual system of medical services caused concern, as the imperial troops, colonial volunteers and irregulars, including all natives, were organised with a peculiar, if not odd, arrangement. Each category was assigned to specific hospitals which soon caused problems, when wounded colonial troops and natives were brought to King William's Town. This quickly produced a confusing state of affairs, which resulted in the relocation of men based on whether or not they were actually imperial or colonial troops. Instances occurred where colonial troops were denied treatment at the hospitals, in contrast with the Fingoes, who were accepted. This resulted in an unexpected consequence, in that the natives soon expected and demanded treatment in King William's Town. Splitting up the medical arrangements for the troops adversely affected the columns and caused Woolfries concern. Further difficulties lay in the fact that the natives were reluctant to take care of their own wounded, for fear of becoming infected in the process of handling wounds. Moreover, there was the British fear of the natives contaminating the wards.

Other problems experienced during the campaign included poor sanitation and the proliferation of waterborne diseases, causing widespread diarrhoea among the troops in January 1878. This was attributed in part, to the insufficient number of available water filters. In reality, these contraptions were not impervious to bacteria and therefore, of limited benefit. Furthermore, the lack of suitable ambulances was acutely felt and requests by the Ordnance Department for more to be sent from home were not entertained. The result was improvisation, using any available local means of transport, which in this case meant ox-drawn wagons, which were a slow if not rough mode of conveyance, for the sick and wounded.

In preparation for the forthcoming invasion in January 1879, Woolfries was faced with much of the same challenges which beset the organisation of efficient and effective medical services the previous two years. This time, the scale of the campaign would be greater and the task of providing optimal medical arrangements, more daunting. However, there was relief in the medical arrangements, in that the dual system of treatment was eliminated, which then immediately placed the care of all natives, irregular, volunteer and imperial forces under the Army Medical Division.

The issue of providing an adequate number of suitable medical personnel was immediate and difficult to expediently remediate, in the weeks leading to the First Invasion. The extent of the operational territory, the multi-column plan of attack and the extended lines of communication, all required a network of aid stations, field and base hospitals. While these had to be manned by competent medical officers, the shortage could be alleviated by compromise, given that Chelmsford expected a swift conclusion to the

campaign. With only 107 medical officers from the AMD to serve the colonies apart from India, the allocation for the Cape was never enough. In preparation for the forthcoming campaign, medical manpower requirements were met by contributions from various sources. The limited AMD contingent totalled only 20 medical officers, which included the medically qualified administrators for the Department, who did not personally attend to the sick and wounded. Officially, the AMD had planned to allocate only 14 medical officers for duty in the entire Cape for the year 1879, though that was before hostilities with the Zulus were expected. Twenty three civilian surgeons were available on contract, to serve the imperial, colonial and native units. Three medical students with the title of hospital dressers were employed for duty in the field, with the task of transferring the sick and wounded from the front to the base hospitals. The Naval Medical Service provided two surgeons as part of the Naval Landing Brigade, with both assigned to Pearson's coastal column. In addition, four civilian practitioners from Durban and Capetown also volunteered to serve Chelmsford, bringing the total of available medically qualified personnel in Natal, ready for field duty, to forty-nine. The result was that on the eve of the campaign, the ratio of medical personnel to total British forces available for the war, was approximately 1 in 366 which, given the state of war especially in a sub-tropical location, was wholly insufficient. The consequences may have been serious and the limitations could have risked a disaster for the AMD and the entire British force.

Under normal circumstances, field regulations for the AMD required the establishment of 200 bed moveable field hospitals on a brigade or division level, with all the necessary equipment, together with auxiliary and ancillary support. To serve the expected needs of the sick and wounded, Woolfryes established a network of base and field hospitals, customised to suit the requirements of each of Chelmsford's three main invading columns. The PMO's new field regulations provided in writing to each medical officer or surgeon required that each field hospital be equipped for the accommodation of 25 patients and would be supported by two medical officers, three AHC personnel, including a cook plus an ambulance conductor. The strength of the AHC in Natal stood at 124 men, facing the same deficiencies in staffing as the AMD. Woolfryes dealt with this shortfall by planning for the supplementation of orderlies from the ranks which would have caused some concern to the regimental commanders. The number of orderlies required was determined by the workload, with an extra orderly, if the patient list exceeded ten and two more orderlies if there were more than 20 patients. The field hospitals close to the combat areas would comprise 50 beds by combining two 25 bed units, with only two surgeons, one of which had to be an AMD member of staff. On the march, the field hospital would follow in the rear of each column and in front of the baggage.

Woolfryes estimated that the hospital arrangements which might be required to be flexible would need to cater to the medical requirements for up to 10% of the white troops and 3% of the native volunteers. The main station hospital was located in Capetown with a 130 bed facility supporting a general base hospital at Durban (200 beds) using tents and converted barracks. The base hospital for Pearson's column based at Herwin, consisted of 100 beds in a large well ventilated building, together with 50 beds in marquees. Two fixed field hospitals of 50 beds each were set up at Fort Pearson and subsequently Fort Tenedos. The invading column itself was accompanied by a moveable field hospital of 50 beds. A base hospital at Pietermaritzburg supported Columns 2 and 3 with facilities for 140 patients, divided between two new brick wards (110) and the remainder in marquees. Fixed field hospitals were established at Greytown (50 beds), Rorke's Drift (75 beds) and Helpmakaar (10 beds). Moveable field hospitals of 50 beds and 75 beds each accompanied No 2 and 3 Columns respectively. A base hospital at Utrecht with 150 beds served No 4 Column, which was supported by a 75 bed moveable field hospital.

Efficiency in the delivery of medical services did not simply restrict itself to the contemporary and accepted standard of clinical care. Time consuming administrative duties and proper paperwork, were considered necessary for detailed records. Woolfryes established a list of standing orders regarding the management of wounded troops, commencing with the time a soldier was first seen by a medical officer. He made it clear that before an action, any front field hospital needed to be made ready for patients. This required clearing the existing sick and wounded, who were to be transported to an advanced depot or base hospital. The first medical officer attending to a wounded case would attach a duplicate diagnosis ticket to the soldier. Each ticket would include the man's name, rank, regiment, and nature of the wound, immediate treatment rendered and the signature of the surgeon. All cases were classified as being either dangerously, severely or slightly wounded. After the action, ambulances would convey the wounded men, escorted by a member of the AHC, to the advanced depot. As all kit had to be accounted for at all times, the wounded travelled with their webbing, arms and ammunition. This was in addition to the food, water and comforts, made available for the often uncomfortably long journey. Upon arrival at an advanced depot or

intermediate hospital, each patient was examined, treated as necessary and sent on to the base hospital, with a sick report and medical certificate. The medical officer in charge would then decide on the management of the patient, who might be kept under observation, or given medication and light duties, if admission as an inpatient was not warranted at that particular time. It is interesting to note that where it was deemed possible, the regiment or unit to which the sick and wounded were attached still sent rations to the hospitals for their men.

In his Field Regulations, Woolfryes was particular in his requirements for an efficient medical service during the first invasion of Zululand, detailing the supply of camp, hospital and medical equipment; the transport arrangements, stretchers, bed supplies and improvised bed design; cooking arrangements, dietary needs, field rations, water supply and sanitation; replenishment of medical comforts and field panniers. The standing orders for paperwork such as requisitions, admission, diagnosis, treatment, discharge and transfer records; diet sheets, daily status data, weekly returns and sanitary reports, were the responsibility of the medical officers. Woolfryes issued a copy of his modified *Field Hospital Regulations* to all medical personnel under the control of the AMD, in particular for the special attention of the civilian surgeons, many of whom were unfamiliar with the military hospital system and the associated care of combatants. Woolfryes' regulations were also intended to convey a message that, he expected all his staff to exercise initiative and ingenuity as necessary, when performing their tasks. Also, all field officers and NCOs were each issued a copy of Surgeon-Major Shepherd's instruction pamphlet '*Aids for First Help in the Field*'. The responsibility of providing medical supplies and appliances required for the care of the Naval Landing Brigade was in the hands of the NMS. All requests and correspondence regarding medical affairs involving members of the service were sent directly to the office of Alexander Armstrong M.D., the Director-General of the Medical Department of the Navy.

Stretchers and 26 Ashanti cots were made available to all the invading columns, for the removal of the wounded, from the scene of action to the front dressing station. With few men of the AHC available for stretcher duty, a corps of three half companies of native bearers was established, numbering 176 in total. These men were attached to and directed by the AHC instead of the AMD, contrary to Chelmsford's orders. Forty eight native bearers were allocated to each of Columns 3 and 4, with 40 assisting No 1 Column and the remaining 24 sent to No 2 Column. A native interpreter was attached to each group of natives, assisted by 16 men from the AHC who were divided between the three main columns. In addition to these companies, Woolfryes expected that each regular army unit would provide stretcher bearers from among the rank and file, on the basis of two per company or equivalent.

Next, '*the question of ambulances caused some anxiety*'. In procuring suitable ambulance wagons, the available ordinary ox wagons used in the 1877-78 campaign were deemed inefficient for the purposes intended, as the design and spring system were too inappropriate for adaptation in Natal and Zululand. Again, improvisation necessitated the use of a few converted civilian transports and five store wagons from the Ordnance Department. Only one wagon per column was allocated to transport all the medical stores, hospital supplies and associated baggage.

Chelmsford recognized the effect of heavy wear and tear on footwear during the recent campaign and accordingly, approved the issue of an extra pair of boots to all soldiers who had participated in the field in 1878. He also ordered the issue of a blue woollen jersey to each soldier, for extra comfort during cold or inclement weather. Each imperial soldier was also issued with a field dressing, placed in the left hand trouser pocket. At the preparation stage, Woolfryes requested that suitable pharmacy and surgery wagons be supplied to conveniently carry the heavy medicine chests. Chelmsford thought the idea was not worthy of approval, which left the PMO with no option but to use field wallets to carry medicines, surgical materials and accessories, as would be required at the aid stations, on pack horses, instead of the weighty field panniers. The impracticality of transporting heavy and bulky veterinary medicine chests was also a concern for the Veterinary Department Command. Veterinary Surgeon Glover reorganised the field supply, using portable cases made of empty spirit boxes, of which there was an ample supply in Natal. These convenient lightweight containers carried estimated veterinary medicines and dressings to treat 100 animals for three months. The supplies would later play an important role, when medical officers faced acute shortages of medicines and were required to improvise.

Campaign experience had shown Woolfryes that special attention to sanitary arrangements was vital, especially in the field. He recognized the need to relax the rules on tight clothing in the arduous conditions of a march. Emphasis on personal care was important and Woolfryes encouraged company officers to be more attentive to the personal hygiene of their men to reduce the risk of lice, ensuring the use of cholera belts and adequate cover at night; regular washing of clothing and linen together with regular inspections

for eye diseases, which needed to be immediately reported to the medical officers. The troops were discouraged from drinking suspect water, eating wild fruits and consuming undercooked foods. Water filtration was organised using various methods. The Royal Engineers constructed simple sand filters for use in the field, whereas the more cumbersome Lipscombe's wicker and Crease's type of filters were issued for use in small field and larger field hospitals respectively. Alum was issued where possible, to deal with the problem of filtering turbid or muddy water.

The 1874 Ashanti expedition led by General Sir Garnet Wolseley was considered a success in terms of the sanitary and medical arrangements. The medical services and arrangements for the transportation of the sick and wounded through 150 miles of dense forests were deemed to be first class. However, it was a short-lived campaign and the experience neither reflected the circumstances of a protracted undertaking, or preparation for unforeseen events. Woolfryes prepared as thoroughly as could be expected for the forthcoming campaign in Zululand. He was certainly competent to deal with the demands presented to him as the PMO. This fact was clearly reflected by the demonstration of attention to detail and concern in the meticulous preparation of his medical field regulations, in late 1878. It must have weighed heavily on Woolfryes' mind, the problem of insufficient numbers of medical officers and the reliance upon civilian surgeons and practitioners. Sufficient medical supplies, so vital in time of war, might not cause too much concern in a short campaign, and would become an issue in the months to come. Nevertheless, notwithstanding the limited and overstretched resources, both the AMD and NMD were cautiously prepared for the demands of the tasks ahead.

Disaster, stalemate and improvisation

The invasion of Zululand began with a three pronged thrust, which quickly failed to attain the expected victory. The Coastal Column reached Eshowe after an encounter with the Zulus at Inyezane, at which point, a stalemate ensued. The Central, or No 1 and No 2 Columns suffered a mauling at Isandlwana and forced Chelmsford to fall back across the Buffalo River into Natal. The Northern or No 4 Column was unable to make an impact and the General's entire plan faltered.

Disease, the scourge of armies since the beginning of time, began slowly eroding the effectiveness of Chelmsford's forces, though it quickly made its mark after the debacle at Isandlwana. As important strategic locations for the main thrust, Helpmakaar and Rorke's Drift immediately became fortified positions, with very poor accommodation for the troops stationed in these garrisons. There was very little or no shelter, for approximately 1000 crowded soldiers and natives at Helpmakaar, exposed to the cold and rain, with most sleeping on wet mealie bags or damp ground. With these conditions, few available medicines, the poor sanitation, together with sleepless nights and surrounded by rotting, urine soaked sacks of grain, the circumstances were ripe for the spread of sickness. At Helpmakaar, the accommodation available for the infirm was rudimentary and consisted of a corrugated zinc shed, which also housed mainly decomposing commissariat stores. Initially, beds for these sick individuals were constructed from biscuit boxes and sacking materials until proper supplies were sent from the base of operations at Pietermaritzburg. The medical officer in command at Helpmakaar, Senior-Surgeon Dugald Blair-Brown, was left with limited available medical supplies, consisting of two field panniers containing pills, powders, bandages and tourniquets plus brandy and port wine, as a result of the stores lost on 22 January.

The risk of epidemics at both Helpmakaar and Rorke's Drift was made known to Chelmsford and his staff, who refrained from taking appropriate action in the interest of military necessities. Entrenched camps were hastily constructed at both locations though it did not take long for health problems to develop at Helpmakaar. There, anxiety and poor morale was superseded by malaise with loss of appetite, followed by widespread fever, diarrhoea and dysentery among the vulnerable. The medical officers had difficulty in officially diagnosing this fever outbreak, as some of the signs and symptoms were not typical, or consistent enough to make a proper assessment. The result was that the medical establishment was split, between a diagnosis of true enteric fever and a mixture of enteric and bilious remittent sickness.

The sanitary conditions at Rorke's Drift were somewhat better with the fever outbreak less severe than at Helpmakaar. Surgeon Reynolds remained at the station following the battle, at which he and three men of the AHC acquitted themselves commendably. He used the storehouse building as a hospital, leaving most of the garrison prey to the elements. The lack of shelter and rotting mealies in the overcrowded conditions, fatigue and declining psychological status, resulted in bilious remittent fever. Surgeon Reynolds described the signs and symptoms specifically, as bilious vomiting, hepatic congestion, delirium with heavy

secretions in the upper respiratory tract and mucoid character of the stools. Woolfryes seemed to think that these epidemics were really typho-malarial in origin, as they appeared to be almost identical in character to those identified in various outposts during the Ninth Frontier war. The increasing numbers of disease at Rorke's Drift soon included Surgeon Reynolds, who reported sick with acute dysentery on 6 February. He too, was evacuated to Helpmakaar and Ladysmith, where he made a full recovery. By early April he had returned to his post to continue with his work.

There were very few wounded from the Battle of Isandlwana to care for. At Rorke's Drift, in addition to the fifteen wounded combatants, 25 patients had survived the attack on the hospital. Twenty of these sick and wounded survivors from the station were finally transferred to Helpmakaar on 26 January, using two ambulances. The disbandment of No 3 Column's 3000 strong Natal Native Contingent in late January, helped avoid further congestion and sanitary problems at Helpmakaar and Rorke's Drift. At both stations in the weeks that followed, fevers and dysentery claimed the lives of one officer and 25 other ranks from both battalions of the 24th Regiment. A further 18 officers and 68 other ranks were hospitalised for the same problems. Arriving at Rorke's Drift on 10 March, Charles Norris-Newman noted that of 90 sick soldiers, only 50 enjoyed hospital accommodation. Given the appalling conditions, he was surprised that more men had not been stricken with disease and died. Considering that the months of January, February and March were regarded as the season of sickness, which was usually associated with the heavy rains, dampness and poor water quality, these epidemics were not surprising.

Lieutenant Charles Harford stationed at Rorke's Drift after the battle, wrote of the confinement and misery at the station by commenting that:

'This terrible state of things, living in such slush, caused a lot of sickness from fever and dysentery which carried off a large number of men and one or two officers. Notwithstanding this, and the knowledge that the Fort was overcrowded, Colonel Glyn declined to have any tents pitched outside to relieve matters.....that no-one but the officers and NCOs of the Contingent were allowed outside. The officers of the Contingent being all mounted.....'

In mid-February, the garrison at Helpmakaar was evacuated with the transfer of the troops to "disease free" Utrecht and Dundee, where their arrival at both locations, coincided with a new fever epidemic of the enteric type. Further similar epidemics developed at Forts Pearson and Tenedos in February, which Woolfryes attributed to a combination of the unhealthy seasonal conditions and the '*filthy habits*' of the tribesmen belonging to the Natal Native Contingent. By May, the prevalence of sickness at Helpmakaar and Rorke's Drift eased to manageable levels. Meanwhile, at Utrecht enteric fever continued unabated. The contemporary theories regarding the cause of the enteric fever outbreaks could not account for the separate events and close timing, affecting all three main columns. During the long march to Pretoria in March 1877, the low sickness rate among the troops was marred within days of having entered the Transvaal capital, as enteric fever took hold. In 1879, the columns acted independently, with little or no contact between the separate forces in the field. However, new epidemics occurred once the troops congregated within the settlements and garrisons. Post-mortem examinations confirmed enteric fever, though the concept of miasma, zymotic disease and the habits of the native troops failed to account for the events. Eventually, upon reflection Surgeon R. Ash Vacy later correctly concluded that germ contamination of water supplies at the stations was the true cause.

Not only had the hospital cot bearers deserted at the same time as the Natal Native Contingent on 22 January, almost the entire supply of medicines, surgical equipment and six ambulance wagons belonging to Colonel Glyn's column, had been lost. The medical officers were left with few supplies which included the pair of field panniers at Helpmakaar together with limited quantities that Surgeon Reynolds may have saved at Rorke's Drift. The need for replenishment of medical supplies was technically alleviated, by the immediate despatch of substantial, though bulky stocks from Pietermaritzburg, which in fact, took almost six weeks to arrive, due to the slow pace of the ox wagons. Also, upon receipt of the news of the disaster at Isandlwana, a field hospital of 75 beds was immediately dispatched from Pietermaritzberg for use at Rorke's Drift and Helpmakaar. This also took time to reach its destination, as the hospital accompanied the medical supplies convoy. Desperate for quinine and pulvis ipecac, the depleted column was supplied by any means, which included postal services and native runners from Pietermaritzburg. In the meantime, a small quantity of medicine was obtained by purchase, from the mission station at Umsinga. Glyn's misery was aggravated by the loss of Surgeon-Major Shepherd, Acting Surgeon Bouee and 11 men of the AHC including Lieutenant of Orderlies, A. Hall, all at Isandlwana. The desertion of the Natal Native Contingent (NNC) in the face of the enemy included the hospital cot bearers, whose loss was difficult to make up.

At the end of January 1879, the advance of the Coastal column had stalled at the Eshowe mission, where the besieged garrison would also become victim to rampant sickness. There, within the confines of the defences, the PMO, Fleet-Surgeon Norbury and his team of three medical officers, were responsible for the health needs of 1858 men. With 800 square feet of available space in the mission church, room for 24 stretchers only, the facilities for the sick wounded were limited in the event of an epidemic. Norbury wrote that circumstances of a siege required that the large church windows be closed and boarded, thereby reducing much needed ventilation. The problem was partly alleviated by making carefully placed loopholes under the eaves and keeping the doors open as often as possible. He procured the church vestry, adding an extra 161 square feet of space for his patients. A marquee for surgical procedures and three bell tents for observation and isolation cases increased the available facilities and accommodation. A shed was constructed on high ground close to the mission, acting as a sanatorium during the day, with the sick brought back under heavy guard well before sunset. Norbury believed that this measure was instrumental in saving a significant number of lives during the siege.

The limited supply of medicines and equipment was a major concern for the medical officers, very soon after arrival in Eshowe. Within a few days, these concerns were serious enough for Norbury to write that:

On my taking charge of the column I found that the supply of medicines and medical stores fell far short of the requirements of such a force, that I consequently made strong representations by letter demanding that a proper medicine chest be provided, no regard was paid to the demands beyond a half-dozen drugs and some lint having been forwarded to Eshowe on the 28th; the consequence was that our communication with the outer world was soon completely cut off, during the entire siege we suffered severely from a dearth of medicines.

With supplies dwindling daily, medical stores soon became depleted to the point where vital veterinary medicines belonging to the Commissariat and Transport Department, would be expropriated by the medical officers. Ironically at Eshowe, in contrast to the shortage of vital medicines, luxuries such as medical comforts, wine and brandy were not initially in short supply.

The coastal belt of Zululand at the beginning of February was normally subjected to intense heat by day, with heavy rain showers and mist. The water in the area was generally of poor quality and was made worse after rains, when it became turbid from the suspension of clay and mica. In the dry season, the rivers and spruits became very low and the streams sluggish, with the water often contaminated from organic and vegetable matter. When sickness took hold, the environmental conditions continued to hamper the recovery of the sick and wounded. The baking sun affected patrols and working parties during the day. At night conditions were different, though equally miserable. Dampness and insects contaminated and ruined much of the food rations, especially the British army staple, the biscuit supplies. With overcrowded conditions at Eshowe, again with little cover against the elements, many men slept in the open or under wagons, always fully dressed, and in a constant state of anxiety. The conditions were ripe for an epidemic, which quickly developed as dysentery and typhoid fever took hold. Both officers and men were equally vulnerable to fevers, diarrhoea and delirium. For those not afflicted by sickness, the conditions were nevertheless morale sapping. Medical reports noted that the principal diseases encountered were continued, remittent and enteric fevers, dysentery and diarrhoea. Within two weeks of arrival, the numbers of sick began to overwhelm the medical resources, with an average sickness rate of 87 per day. At the peak of infirmity, 105 men or 7.5% of the entire garrison were listed as sick from disease. Norbury expressed his discontentment with the site at Eshowe, which he thought would never be chosen by anyone educated in the principles of sanitation. The surrounding damp soil was black, with a thick layer of perceptibly odorous decomposing vegetable matter or impurities, ideal for miasmatic contamination. Norbury theorised that the poor drainage of the impure soil, subjected to heavy rain, allowed emanations of humus to mix with the body exhalations of men, crowded under the protection of waterproof and therefore, airproof tarpaulin covers.

The atmosphere of concentrated poison would then strike at the tired and overworked men whose constitutions, or resistance to infection, had become weak or compromised. The effect of the hot sun resulted in numerous heat related problems. Periods of fog, especially during the cold damp nights, when temperatures plummeted to an uncomfortable level, only made matters worse. The moans and delirious condition of many patients, together with the stench and contamination with excreta, fluids and human matter in the hospital, caused Norbury further concern. He complained about the limited supply of carbolic acid, required to wash the interior of the hospital and ultimately resorted to using dry earth as a deodorizer each time the sick were carried to the sanatorium.

Staff Surgeon Longfield, initially stationed at the Base Hospital at Herwin near Stanger, was ordered to take responsibility at Forts Pearson and Tenedos effective on 18 January as Pearson's column began the push towards Eshowe. Longfield assessed the newly established encampment at Fort Tenedos and recognized immediate problems, including the poor available accommodation. This he highlighted by reporting that a Lieutenant of Native Sappers died on 20 January in a '*filthy kaffir hut which he shared with a Sargent of the Native Contingent also suffering the same*'. In his view, the overcrowded bell tents and the small farmhouse were totally inadequate and unfit for a hospital. Longfield reported that this sentiment was echoed by the troops stationed at the location. Between January 27-31, the sick list which had previously averaged 16 per day, not counting outpatients, rose suddenly to 34, mostly diarrhoea cases. Longfield attributed this to exposure to the elements, which had mainly affected the four companies of the 99th Regiment, having returned with the wagon convoy from Eshowe. He described these soldiers as inferior in physique, exhausted by the march and looking like raw recruits sent straight to Foreign Service. He wrote that they were:

Poor weakly ungrown lads many of whom had never fired a shot (in practice) till within past few days. The condition of these men was wretched. The drafted ones unprovided with flannel shirts, the calico rags worn instead cold damp and comfortless; the weight of their belts rifles and ammunition (they had carried nothing else, had proved beyond their strength and ill suited did they look to cope with a full grown and active enemy.

The troops at Fort Tenedos worked hard in preparing the defence works under hot conditions, which Longfield described as a climate with debilitating influence. The lack of adequate shelter initially left many soldiers exposed to rain at night within the fort and the impure water supply only made matters worse. Six new cases of typhoid fever at Fort Tenedos, including two deaths in a ten day period, from 17-27 February, followed by two the following week, caused Longfield concern, due to the extremely virulent nature of this outbreak. The presence of ulcerated and sloughing lymphoid tissue or Peyers patches in the intestinal lining, noted during a post-mortem examination of a private of the Buffs, confirmed his initial diagnosis. The number of dysentery, typhoid fever and diarrhoea cases reached 187 by the end of February. This epidemic was believed to have been caused by noxious emanations from the two large swamps, on either side of the Tugela River, between the mouth and within half a mile of both Forts Pearson and Tenedos. By 12 March however, Longfield was pleased to report that with improved accommodation and food for all 268 officers and men, the daily sickness rate had fallen to manageable levels. Early in the campaign, the men of the Naval Landing Brigade fared better than their army counterparts, as they were considered healthier, well clothed, regularly fed and provided with superior colonial tents instead of the thin canvas bell tents.

Longfield was proud of the sailors belonging to the Naval Landing Brigade and remarked that:

The power that sailors possess of making themselves comfortable under all or any circumstances is proverbial and so conspicuous as when they are placed alongside their Military brethren then it is their wonderful facility in providing the means to gain their ends become most apparent and their superiority over all others in roughing it comfortably.

In his report to the Director General of the Naval Medical Department, dated 12 March 1879, Longfield stated that while he had ensured the availability of ample medical supplies and appliances for both his naval and army patients, deficiencies were evident. He expressed concerns in complaining bitterly that his urgent request for 10 lbs of carbolic acid, for deodorising and disinfecting the filthy accommodation at Herwin Base Hospital, had been met with a shipment of only 6oz. He considered the poor conditions there to render the facility useless. Cleanliness was recognized by Longfield, as the key to limiting the spread of disease, the practice of which was heavily stressed by the Staff Surgeon. However, he noted that the use of latrines by the natives was almost non-existent. By urinating and defecating in the bush, this habit only aggravated the medical officer's attempt at proper sanitation arrangements, to reduce the extent of the epidemics at the Forts and Base Hospital.

At Eshowe, Norbury was meticulous in applying his knowledge to the prevention and treatment of disease, though he faced numerous challenges. Serious sanitary issues also compounded Norbury's concerns, to the extent that sentries were posted at the sources of drinking water to prevent contamination. All vegetation was removed for some distance from the garrison and most ablution activity was not permitted among the troops inside the walls. Special arrangements were made to dispose of faeces by burial or burning and to reduce the likelihood of further problems; horses and cattle were accommodated outside.

Regular scavenging of the area by specially designated units, both inside and outside of the fort, was carried out. Thorough cleaning of the tents was performed regularly, to the extent that they were struck, the ground scoured and new sand was added to the sites. Meals were cooked outside the fort. All meat was thoroughly inspected for disease and any suspect carcasses were immediately disposed by burial. The cemetery was located to the west of Eshowe, on the reverse slope of a hill, though the cattle were buried at a distance of five hundred yards away, in a small valley chosen to eliminate any possible contamination of the fort. Despite the PMO's lack of a true understanding of disease aetiology, his continued efforts in ensuring a high standard of personal hygiene and sanitation at Eshowe certainly prevented a greater and more catastrophic epidemic, than occurred otherwise.

finally relieved on 3 April, the Eshowe garrison had suffered 31 deaths from disease, with the expectation that the depleting ration stock would last for only another week. Upon arrival with the relief force, Charles Norris-Newman observed that the provisions for the sick and convalescing patients had been inadequate. 34 patients were recovering in hospital located in the mission church, while 70 others were accommodated outside.

Chelmsford and his commanders had expected that Pearson's column active in the coastal belt would experience a long list of sick and wounded during the campaign. However, no one expected the number to be so great. Norris-Newman's impression was that the Command thought that either the lack of medical personnel or want of medicines may have been the cause. Unconvinced, in May 1879, he decided to investigate for himself during his visits to the three principal hospitals in Durban. There, during his enquiries, he discussed matters concerning the reports with the medical officers regarding the organisation and failures of the medical arrangements at Eshowe and the hospitals serving Pearson's troops. He correctly concluded that without doubt, during the early part of the campaign, the forces were miserably deficient in medical officers and proper medicines (particularly quinine), instruments and medical accessories.

Transportation difficulties and military necessities placed on the Eshowe relieving column, limited the availability of tents for the sick and wounded at both the besieged mission and Gingindhlovu. The relieving force was lightly equipped, with only one field hospital consisting of 50 beds. Accompanying ambulances and Ashanti cots were also few in number. The challenges that faced the medical staff on the road to Eshowe, given the unquantifiable, though dire medical situation at the mission, quite rightly gave cause for concern. Staff Surgeon Longfield described the inadequate transport granted to the medical department of the relieving column as:

a large wagon and two small carts for the medical stores, and an ambulance capable of accommodating about eight men and a non-descript vehicle drawn by four horses which could carry four persons sitting. One of the small carts was allotted to the Naval Brigade, the other vehicles were utilized by the Army Medical Dept.

Longfield and his colleague, Staff Surgeon Shields did ensure that an ample supply of medicines and instruments for all combatants was made available for transportation with the column. Though he had been assured by the AMD, that an adequate stock of appliances would be taken too, this last minor detail would later have a personal significance for the naval medical officer. Once relief of the garrison at Eshowe finally occurred, transportation was quickly organised for the expeditious evacuation of the sick and wounded men to Fort Pearson, with the process completed by 8 April. Upon arrival at the hospital, the worst cases were immediately despatched to Durban and Herwen in 12 ambulances.

Throughout the AZW, another concern for the management of the increasing numbers of sick and wounded, was safety. Unlike warfare in Europe, where these men could be safely left behind by an advancing or retiring army, they often had to be moved away from the theatre of operations in Zululand. A Zulu attack on any of the numerous exposed field hospitals would have had tragic consequences, though fortunately, no such catastrophe occurred.

Colonel Wood's column operated in country more amenable to a healthier experience, compared to the rest of the Chelmsford's army. This environment did not cause the high rates of disease experienced by his fellow column commanders, which reduced the burden faced by the medical staff. A collation of epidemiological rates between Wood's column and those troops campaigning in the coastal belt is limited by the lack of detailed sickness comparison records. Woolfryes' report on the medical history during the war admits that, with so many units having been broken up to garrison so many posts, an analysis was difficult to determine. However, using mortality and invaliding statistics, it is possible to determine some interesting facts, in comparing the experience of Wood's units stationed in the north with that of those at

Eshowe, together with the relief force, toiling along the coastal belt. The sickness rates in the 3rd, 57th, 60th, 91st and 99th Regiments were more than five times higher compared to those in Wood's column namely the 13th and 90th Regiments.

Woolfryes wrote in his report to HRH The Duke of Cambridge, that the field forces were expected to reach as high as 35,000 troops, as additional units were expected from England. His main concern regarding this likelihood was the continued lack of the medical staff, as AMD reinforcements would not be sufficient to keep up with demand. The dearth of available medical officers at the beginning of the campaign, prompted Woolfryes to take immediate action. He forwarded a telegram to England with a request for 20 more surgeons. The number of medical officers and civil surgeons did increase, with the arrival of two medical officers and eight civil surgeons in February. This disappointed the PMO, as the shortfall did little to alleviate the acute problems in efficiency of the Department. In February and March, four civil surgeons were allowed to leave, following the expiration of their engagements and with losses of other medical personnel during the campaign. The heavy attrition would add to Woolfryes' continued predicament. In March, 26 medical officers and 6 civil surgeons arrived for duty, which facilitated the requirements in the large number of field hospitals, that could not all be properly manned by medical staff. The shortage of AHC personnel and regimental orderlies also needed to be remedied, as the lack of hospital orderlies had resulted in the employment of convalescents in that role. At the commencement of the war, the total strength of the AHC consisted of 124 men of all ranks. In March and April a draft of 143 arrived; in July 115 landed, followed by another 52 in August.

Rumours began to circulate in certain English newspapers claiming that the civil surgeons sent to South Africa were actually employed solely on service in native units. An anonymous report claimed that, not even a single medical officer was attached to Colonel Pearson's entire column; this invasion force was sent into Zululand without any AMD personnel. The author was completely erroneous and omitted the fact that medical officers belonging to the Naval Medical Service and civil surgeons, were assigned to the column. These innuendos prompted Surgeon-Major E. B. Hartley, to respond on Woolfryes' behalf, to set the record straight. He believed that the negative statements were political in nature and designed to cause consternation within both the British Medical Association and the British public. Hartley's response ensured that credit was given to several named civil surgeons, on service with Chelmsford's regular troops. The entire medical service was strained during the opening chapters of the campaign in 1879; with so many deficiencies and concerns becoming evident, to the point that confidence in the associated departments was beginning to erode. The correspondent of the *British Medical Journal* wrote:

...that a force of more than five thousand men was sent into Zululand to take the field with less medical appliances than a force of the same strength would be supplied with in the autumn manoeuvres at home. He says that in the attack at Gingalovo on April 2nd, there was a lamentable deficiency of stretchers and stretcher bearers. His opinion is that the Zulu war will prove what would have been the utter confusion of the Army Medical Department, if England had been drawn into a European war.

Disease, reorganisation and recovery

The second phase of the campaign contrasted significantly from the First Invasion, regarding the medical experiences. Deaths from wounds received in action among the Regular forces during the period 6 January – 29 March 1879, reached a staggering 801, while sickness related deaths totalled 78. Notwithstanding the fact that the mortality rate from disease was not acceptable, given the conditions during the campaign, it was not unexpected. The cost during the subsequent six months was unpleasantly much higher. In that period, 241 men died of non-combat related sickness. At the same time the number of soldiers killed in action or subsequently dying from wounds received, fell to a total of 37 men. Again, No 1 column, renamed the 1st Division, would suffer the greatest from diseases, especially among the inexperienced, un-acclimatised reinforcements. Compromised sanitary conditions, environmental factors and rapid spread of disease, seemed to repeatedly torment the medical officers. In May, the unsanitary camp at Gingindhlovu was moved to the newly established Fort Chelmsford, with a field hospital of 75 beds. While the site chosen made sense strategically, satisfactory sanitation was practically impossible due to the pre-existing conditions. The available water supply was unpotable and regarded as contaminated with the remains of decomposing Zulu bodies in the area, along with the many dead oxen, most of who had died from disease. To make matters worse, the clay soil surrounding the fort did not drain well after rain, which quickly became tenacious mud. Again, Woolfryes singled out natives as those responsible for the ills at the fort,

especially since he considered the condition of the nearby NNC camp to be filthy and detrimental to the general health and well-being of the white troops. Sickness in the Lower Tugela area became a bane to the commanders and in such circumstances, the incidence of disease increased exponentially. Surgeon-Major Thomas Tarrant, Senior Medical Officer of the 1st Division, was of the opinion that the preparation of the soil in constructing Fort Chelmsford, had produced a miasmatic effect. Diarrhoea, dysentery and fever took hold among the young men of the 60th and 91st Regiments but the cause was not the soil. The newly arrived 57th Foot which had suffered under the heat in Ceylon for the previous five years did not fare better. Upon arrival in Durban, these units undertook the gruelling march to Eshowe in constantly rain soaked uniforms and in consequence, their health very quickly suffered.

The sick at Fort Chelmsford were administered quinine three times a week, with enormous amounts consumed to treat fevers. To deal with the water problem, filters were used and some common sense prevailed, by boiling all the drinking water. Ironically, many of the men that had marched up to the Lower Tugela and beyond survived the combat, with few suffering from the prevailing diseases in the area. However, many soon joined the long list being transferred in large and frequent convoys of sick troops to Fort Pearson, thence back to Durban. In one week alone, 210 men were transferred to Fort Pearson, mostly suffering from fever and debility. Most of the sick soldiers recovered sufficiently to resume their duties and those deemed weakly were given guard assignments. The medical officers organised the movement of the sick and wounded efficiently, despite the overcapacity at the 200 bed hospital at Fort Pearson, which needed to serve primarily for the wounded casualties from the front. To compensate for the expected casualties, the 70 mile distance from Fort Pearson to Durban was lined with resting places at Stanger, Compensation Flats and Verulam, each with three hospital marquees, bell tents. Each location was placed under the command of an NCO of the AHC. Ten mule-drawn ambulances were used to convey the men as far as Saccharine, where a train was available with a specially fitted railway van with eight stretchers, for the final journey to Durban. In March, as the flow of reinforcements gathered momentum, Woolfryes arranged for additional hospital accommodation in Durban. The capacity in the General Base Hospital was increased to 450 beds and a recently built nominally staffed civilian hospital, accommodating another 100 patients, was handed over by the Governor of Natal.

Concerning the general state of health in the 1st Division, Woolfryes was pessimistic and noted this in his reports to the extent that he expected no permanent improvement, unless the units could be moved to more salubrious surroundings. He regretted that military necessities had taken precedence over the well being of the troops. Woolfryes attributed the suffering from rampant diarrhoea, dysentery and fevers of all types to a long list of causes. These included marsh miasma, contaminated water, and constant exposure to the hot sun by day, dealing with the cold by night, heavy duties, fatigue and depression resulting from inaction and monotony. The rains that season were continually heavy in what should have been the dry season along the coastal area. Admissions into hospital among the regular troops reached as high as 204 cases per 1000 men. The Colonial volunteers and tough Naval Brigade did not fare any better, with 327 combined admissions per 1000 men. Based on observations made by the attending medical officers at Forts Chelmsford and Pearson, enteric fever cases appeared not to have originated in the former, contrary to previous opinions held by some medical officers. Treatment for such sickness was a dose of quinine, administered to each of the patients twice weekly. By early June, the numbers of sick were so great, that a concerted effort was made to ease the pressure at Fort Pearson, using extra wagons to move the men to Durban.

The marked contrast in the relative health between the 1st and 2nd Divisions, including the Flying Column, was influenced heavily by environmental factors. The climatic conditions and geomorphology of the different theatres of operations differed significantly. In the malaria-prone coastal belt, during the riskiest time of year, from March till June, the 1st Division suffered heavily in static locations, where sanitation challenges became an increasing problem, with the prolonged inactivity. The 1st Division experienced 1328 hospital admissions with enteric fever accounting for 295 cases and 69 deaths. Simple continued fever resulted in 538 cases with 9 deaths while remittent fever afflicted 262 men, resulting in 3 deaths. Fifty eight soldiers, mostly belonging to the 2/3rd and 88th Regiments were stricken with ague, also known as malaria. Interestingly, these units had recently served in Mauritius. The 2nd Division and Flying Column operated in country used to less precipitation and higher altitudes, between 1,500-2,000 feet above sea level. The troops were kept more active with greater reconnaissance duties, frequent change of camps, which were mostly situated on favourable ground. The incidence of sickness among the troops operating in Northern Zululand did not cause the same level of concern among the commanders and

medical officers, compared to the experience in other sectors. Surgeon-Major Charles Cuffe, Senior Medical Officer with the Flying Column reported that:

The health of the troops comprising the column has been excellent throughout the march; scarcely one per cent sick – this is to be attributed to the great care originally bestowed in selecting none but healthy men for active service as well as the comparative salubrity of the climate and good food and water, and no alcohol.

The same view was echoed by Surgeon-Major Andrew Semple, Senior Medical Officer, 2nd Division when he remarked that:

.....the general health of the troops in the Second Division continues to be very good. The average daily sick has not exceeded 10. There are to be observed a few debile men on the march who fall out and require, or at all events are put into an ambulance, but their number is comparatively few

In the south, Surgeon-Major Tarrant attributed the cause of the prevalent enteric fever to the importation of the disease into Fort Pearson from Thring's Post and Saccharine. Though, this was not viewed as the only source from which it was transmitted. Tarrant stated that a large proportion of cases admitted under remittent fever at Fort Chelmsford when transferred to Fort Pearson, had their diagnosis changed to enteric with many such cases proving fatal. Regarding intestinal diseases, there were 221 dysentery and 341 diarrhoea cases, the greater proportion of which came from Fort Chelmsford. Tarrant could not be certain of the diagnosis as no post mortem examinations were carried out to confirm the clinical signs. There was disagreement between the medical officers as to the official, if not entirely correct diagnosis. Tarrant felt that all the cases were in reality enteric fever, while Surgeon-Major Charles Giraud, SMO of the 2nd Brigade at Fort Chelmsford, felt that most of the sickness at the Gingindhlovu camp during April was caused by non-specific fever, dysentery and diarrhoea. His diagnosis was supported by Surgeon-Major John Edge, Medical Officer of the 91st Regiment and other colleagues. In May, the fever changed to remittent fever, the typho-malarial type. Jaundice was also a characteristic sign, with pyrexia, hepatic congestion and gastric irritability, bilious fecal stools and coloured urine, as dark as strong tea or coffee, all confirming the diagnosis. Management of this condition was simply, a milk diet and quinine combined with opium, if there was diarrhoea without the signs of delirium.

The issue regarding the causes of the epidemic, among the troops operating in the coastal belt, did not abate and simply continued after the end of the war. Surgeon-Major R.W. Jackson, having arrived in Natal in August 1879, wrote of the debate among medical officers of the 1st Division regarding the nature of the disease. He remarked that:

Immediately on landing at Durban in Natal, it was obvious that a difference of opinion existed between the medical officers in the field and those at the base hospital regarding the fever - the former, watching the ranges of temperature indicative, in most cases, of the remittent type, were in favour of a malarial form, while the termination of the cases and subsequent post mortem examination demonstrated the presence of enteric lesion, and caused the medical officers at the base to pronounce the fever typhoid.

The outbreaks of enteric fever in the zones of conflict perplexed the medical establishment. Divided forces stationed at Utrecht, Helpmakaar and the Lower Tugela, all separate from each other, with little direct communication between each other. Strangely, all were afflicted by the disease. Soon after landing in South Africa, reinforcement units were sent to Pietermaritzburg where soldiers were stricken with sickness. The medical officers were unable to provide answers to this persistent problem, particularly in cases where enteric fever increasingly took hold among the men returning from the field to the towns. Surgeon R. Vacy Ash, stationed at Pietermaritzburg in 1879, was convinced that the water was good overall and the sanitation satisfactory. He also believed that even in the native villages, the habits of the inhabitants were clean. However, in his notes, he thought that the epidemic was somehow caused by stagnant water, but even with this in mind, he still had his doubts. Ash considered both the theory of germs and a specific poison as the cause of the disease. That the idea of these germs in question might be carried on the persons themselves, did not entertain him at the time. He left the case open for further discussion.

Enteric fever epidemics in Pietermaritzberg occurred both in 1878 and 1879. By observation rather than using a scientific approach, a connection was eventually made between the disease and contaminated or unpasteurised milk, rather than poor water quality or contagion brought by troop arrivals. Dr James Allen, a

medical practitioner in Pietermaritzberg during the AZW, noted that the incidence of the disease among the civilian population was significantly higher in families that either owned cows or lived very close to one of the 23 dairies in town. Since most families owned two or three cows, eradication of the disease would be a difficult task. After the AZW, in order to reduce the incidence of the disease among the troops, most of the soldiers stationed at Pietermaritzberg were sent to Pinetown which became a permanent military camp till 1887.

In addition to the management of the disease outbreak in the coastal area, deficient medical supply inventories continued to be a constant concern. The correspondent for *The Lancet* reported that, although the medical officers working in the coastal area had performed their arduous tasks in a creditable manner, the provision of medical and surgical essentials caused serious problems. He echoed the frequent complaint among medical officers serving with the advanced field hospitals, of neglect in the proper management of supply for the front stationary hospitals, which at times were deficient, as they wholly depended on the Base Hospital at Durban.¹ The acute nature of the dilemma affecting the medical officers working with Fleet Surgeon Norbury, prompted the PMO to write to his superior at home on 24 April, begging for more medical supplies. In his request, he strongly complained that the AMD supplies were insufficient to deal with the increasing number of cases resulting from sickness and concluded by stating that :

I write to beg for some medical stores that the AMD is totally unable to supply medicines in sufficient quantity. There is a great deal of sickness, diarrhoea, dysentery and a mild sort of intermittent fever the two former are obstinate and we are at wits end to provide "Binders".

To make the point clear, Norbury attached to the request, lists of medicines and associated provisions that had been supplied to the Naval Landing Brigade in March and April, indicating a shortage of necessities. The request was received on 22 May and acted upon within a week, though the Director General expected that the AMD would make up any deficiencies, since certain items were not normally part of the NMS's inventory. The extra medical supplies were sent with a Royal Marine contingent, preparing to set sail for the Cape on HMS *Jumna* in the first week of June. In view of the reports regarding sickness among the troops on campaign, the NMS decided to order 1200 pocket filters for the use by the marines. In the rush to provide such items, a debate ensued as to which type of device was most suitable. Ultimately, it was agreed to send equal numbers of carbon and silicate filters though only 1077 were actually made available.

Reorganisation of the medical services

In organising the medical services for the First Invasion, Woolfryes allocated his limited manpower resources into small detachments accompanying each column. This was potentially detrimental, as any unforeseen circumstances and the long advance into Zululand, may have effectively strained the lines of communication. In turn, this would hamper or prevent a safe and efficient method of moving the sick and wounded to the Stationary Field and Base Hospitals. While No 1 Column became tangled in the siege at Eshowe, the disaster at Isandlwana arguably avoided an alternate scenario for Woolfryes, had Chelmsford and No 3 Column become isolated and battered, deep in enemy territory.

In preparation for the Second Invasion, Woolfryes reorganised the medical services more efficiently, to serve the newly formed Divisions and Flying Column. With an increased number of medical personnel, he was able to distribute more manpower to individual units and the supporting hospitals. North of the coastal areas, Chelmsford's new strategy ensured secure and efficient lines of communication, for the Second Division and Wood's Flying Column. Chelmsford's plan for the reinvansion of Zululand placed greater responsibilities on the AMD. The reorganisation of the forces required an increase in the number of medical facilities. These arrangements involved the established base hospitals supporting a chain of stationary medical posts which included new hospital stations, organised in Zulu territory 12 miles apart and all along the lines of communication. This was in contrast with the previous strategy, where the stations would be moveable and follow the advancing forces. Woolfryes had never contemplated the new arrangements, which he quickly realised, required a considerably greater number of medical staff.¹ His response was to send another telegram immediately to England via Madeira, requesting 20 more surgeons. He arranged for a small 25 bed field hospital to be set up at Balte Spruit, as a staging point between Kambula and Utrecht. A similar hospital was organised at Doornberg, to augment the 50 bed hospital at Dundee, on the route to Ladysmith, which served as the 150 bed base hospital of the 2nd Division. Later,

when the troops moving eastwards left Doornberg, the line of communication changed. The permanent depot and field hospital were moved to Conference Hill. Woolfryes viewed this alteration in the arrangements detrimental to the conveyance of the sick and wounded, as the route to Ladysmith immediately became longer and therefore, more vulnerable to Zulu attacks. The medical station at Newcastle was converted from a very small hospital of 12 beds to a larger facility. This could accommodate 50 troops, though the hospital soon expanded again, to take care of 100 patients. The main purpose for this expansion was to establish the medical station as a convalescent depot, to relieve the base hospital at Utrecht, which served as the base hospital for the Flying Column.

To support the 1st Division, Woolfryes began by increasing the capacity of the General Base Hospital at Durban to 400 and later 450 beds. The extra accommodation demands were met by the availability of a recently constructed, fully equipped though unused, civil hospital. The hospital was augmented by setting up an auxiliary facility, using marquees. Located by the beach two miles from the centre of the town the site was also ideal for a convalescing facility for those recovering from fever and dysentery. The conditions at the Hospital were a marked improvement compared to the field stations. This was reflected in a much reduced death rate among the sick and wounded, which fell to 5 per 1000 or 0.5%. However, during May and June, the high incidence of dysentery and diarrhoea perplexed the medical officers. Eventually, it was deemed that the quality of the water supplying the hospital was poor. Coincidentally, the sickness rate from the bowel diseases fell dramatically soon after the source of water was changed. Ironically, the Mayor of Durban declared that the townspeople had used the same contaminated water supply and without any ill-effects.

With a complete reorganisation of field forces, the arrangements for the newly named 1st Division operating in the coastal belt, involved the abandonment of the Herwin base hospital and relocating it to a new 200 bed facility at Fort Pearson. There, the facility comprised of marquees, tents and Zulu huts.¹ Woolfryes recognised that although the site was chosen for the defensive capabilities, from a sanitary point of view, Fort Pearson was close to swamps and therefore increased the risk of disease outbreaks.

1st Division:

Fixed field hospitals

Stanger 25 beds
 Thrings Post 25 beds
 Fort Chelmsford 150 beds
 Fort Crealock 50 beds

Moveable field hospitals

1st Brigade 75 beds
 2nd Brigade 75 beds
 Naval Brigade 30 beds

2nd Division

Base hospital at Ladysmith 150 beds

Fixed field hospitals

Newcastle 50 beds
 Dundee 50 beds
 Landman's Drift 25 beds
 Koppie Allein 25 beds
 Fort Newdigate 25 beds
 Fort Marshall 25 beds
 Fort Evelyn 25 beds
 Rorke's Drift 25 beds
 Sand Spruit 25 beds
 Krantz Kop 25 beds

Moveable field hospitals

1st Brigade 75 beds
 2nd Brigade 50 beds

Flying Column

Base hospital at Utrecht 150 beds

Fixed field hospitals

Balte Spruit 35 beds
 Conference Hill 75 beds
 Luneburg 25 beds
 Potgieter's Farm 10 beds

Moveable field hospitals

1st Field Hospital 50 beds
 2nd Field Hospital 50 beds

In addition to the above mentioned facilities, an officers' hospital was established at the Base of each Division or Column, namely Utrecht, Ladysmith, Pietermaritzburg and Durban, all capable of accommodating 10 or 12 patients. The emphasis on efficiency became paramount, with the reorganisation

of the medical services. To avoid bottlenecks and congestion throughout the network of medical facilities, it was directed that:

With a view to afford sufficient accommodation for sick and wounded from the Front, Medical Officers in charge of advanced permanent Field Hospitals and Divisional Base Hospitals, will transfer every week, or as quickly as practicable, to the Convalescent Depot or to the General Base Hospitals, at Durban or Pietermaritzburg, such sick, wounded and convalescent Non-commissioned Officers and men as are not likely to be soon fit for duty in the field.

The mounting numbers of sick and wounded required suitable and specific convalescent facilities, for those requiring less supervision and preparation for return to active duty. Woolfryes therefore, arranged for depots to be formed at Stanger, Pinetown, Newcastle and Wynberg. This arrangement worked well as significant numbers of patients were transferred from the base hospitals.

Due to the heavy workload in dealing with mostly sick soldiers, a detailed General Order was issued in early May, clarifying the process for managing the administrative requirements. The new requirements upon admission into hospital, involved more accountability and included the following documentation as prepared by the unit commanders:

1. A statement of accounts up to date
2. A list of necessaries in possession
3. A list of clothing in possession
4. A list of accoutrements and equipment in possession
5. Company defaulter sheets
6. A list of blankets, waterproof sheets (if any) in possession
7. Detailed statement of special claims

The documents and relevant receipts, would accompany each soldier during a transfer to another hospital, depot or a return to his unit for active service. As all the above items were the property of Her Majesty's forces, any losses or damage required an accounting and a report into the circumstances involved.

In the period leading to the final clash of foes at Ulundi, the supply of AMD officers and civilian counterparts sent to South Africa as part of the reinforcements did not match the demands. Fleet Surgeon Norbury reported that eight naval medical officers were serving ashore with Chelmsford's forces as having been:

lent to the Army Medical Department for Duty, that Department alleging that it is suffering from a great scarcity of Medical Officers.

While stationed in the north, the Flying column enjoyed relatively good health, described by Woolfryes as "exceptionally good," which remained as such so long as they stayed in the north. When Colonel Wood's column eventually marched southwards and arrived at St. Pauls, enteric fever took hold. On the other hand, the 57th and 3/60th Regiments that had suffered so severely from disease at Fort Chelmsford improved in health as they travelled away from the coastal belt towards Ulundi. However, the 60th were to suffer again in the Ngome Forest in pursuit of Cetshwayo, where enteric fever struck again among the troops, after the fatigue of the march and previous experiences.

Britain takes note and delivers a dose of medicine

The shortage of medical officers and civil surgeons during the AZW resulted in the recourse to advertise for more volunteers for the medical services. With medical schools targeted, concern was expressed that these inexperienced practitioners were being recruited without the need to pass the Netley examination or attend the required course. Mention was made in *The Lancet*, that the army had accepted some individuals who had failed the necessary examinations for admission to the medical service of the army. The report was critical of the medical services and stated that:

.. the extreme mismanagement of the Army Medical Department has so reduced the efficiency and detracted from the popularity of that service that at first touch of warfare, even on a limited scale

and with a savage people, it is found to be thoroughly undermanned and quite inadequate to the demands upon it.

As Britain took serious note of the events in South Africa, the public view that the Government in Britain was not doing enough for the sick and wounded in South Africa, was addressed by the Secretary of State, Lord Elcho, in the House of Commons on 16 June 1879. The Government believed that it was very much aware of the conditions and needs of the troops and medical services. Elcho declared that the ruling party had:

'been fully alive to the necessity for making provision for the sick and wounded'.

The Secretary of State's report dispelled the notion, that there was an inadequate amount of medical supplies in Natal and that there were insufficient numbers of doctors and nurses. He ventured to assure the House by stating that the supply of medical officers was ample, except for a deficiency of quinine in the Lower Tugela, which had been expediently addressed. In his opinion, there had been no extra demands for medical supplies and comforts. He further stated that the sick rate amounted to 5.75% of the strength which, given the fact that campaigning had been hard, this proportion was actually low. While the report was not untrue, and only referred to the Regular forces, few details were provided and no account was given of the extent of sickness in the coastal area of Natal and Zululand. Miasma-related disease rates in 1879 were much higher than those experienced during the Ninth Frontier war. The incidence of sickness and hospitalisation due to continued and paroxysmal fevers, was more than double the rate in 1878 and deaths from these diseases were three times higher. Many cases were wrongly classified as a result of misdiagnosis, which would account for the fact that enteric and typho-malarial fever cases were not properly grouped together, for statistical purposes.

During the continued intense debate in the House of Commons on 16 June, concerning the conduct of the war, the British Government acknowledged that there were 62 military and naval surgeons serving in South Africa together with 38 civil surgeons. In addition to these numbers, 9 military and 2 civil surgeons were en route to South Africa and 13 others were under orders. The Government reassured the House that, the AHC strength consisting of 9 AHC officers and 400 men, was actually more than sufficient to assist Chelmsford's army of 22,000 men. This statement to Parliament contradicted the information given to Mr Mackinnon who liaised with the heads of the AMD in early June 1879, as representative of the Stafford House Committee, he was duly informed that a total of 200 medical officers and civilian colleagues, were either serving under Chelmsford, or were under orders to sail to South Africa. The medical reinforcements and replacements sailed from England, distributed in a number of different transports. Each ship arrived in Durban with their contingent of medical personnel, which usually consisted of only a few medical officers, thus reflecting the limited available and immediate resources back home. The steamship *Russia* arrived on 27 March with two surgeons, followed by the *Palmyra* an hour later, loaded with AHC supplies. Two days later the *City of Venice* brought two surgeons and five NCOs belonging to the AHC. More medical officers and their civilian colleagues also trickled in on board the *Olympus*, *China*, *England*, *Spain* and *Egypt*.

The public continued to press the Government on further issues involving the controversial handling of the Zulu War. With regard to the organisation of military and medical supplies and deployment of inexperienced young soldiers, *The Morning Post* stated that:

..... the natural outcome of a large and inexperienced organisation... suddenly sending troops to what had hitherto been regarded as a happy and salubrious hunting ground, that they would be brought face to face not only with a big war, instead of an easy victory over naked savages, but also the most virulent forms of disease which a hard campaign and a treacherous climate can inflict on unseasoned troops.

The National Society for Aid to the Sick and Wounded in War, (NSA) decided to assist the military medical establishment by supplying comforts such as socks, tobacco, newspapers, tea and coffee to the hospitals in Natal, instead of sending volunteers. In the past, the Society had involved itself in assisting the medical services in foreign conflicts by supplying medical and nursing personnel. The responsibility of transporting and distributing the supplies was given to J.S. Young, Deputy Commissary, Commissariat and Transport Department and Commissioner for the Society in South Africa. He landed in Durban on 16 March 1879, a day before the arrival of the 91st Regiment. There, Young found a state of chaos, with no organisation. He was immediately appointed Superintendent of Disembarkation, and worked tirelessly for

three weeks directing the unloading of troops and supplies. At the same time, he hired eight local natives to separately move the Society's supplies. In his first report to the NSA, the Deputy Commissary remarked on the continued obstruction from the naval and Colonial authorities. Furthermore, he experienced further impedance by way of :

active obstruction from the avaricious commercial agents – making fast fortunes of the larger misfortune - the war.

To augment the supply of comforts for the sick and wounded soldiers, Young appealed for donations of reading materials from the public in Durban. The townspeople also responded in kind by supplying fruits and delicacies to the hospitalised soldiers. By May, groups of concerned individuals set up War Relief Funds in Durban and Pietermaritzburg,

.....with a view to providing little luxuries, so desirable, so desirable in cases of sickness, beyond the mere medical comforts ordinarily furnished.

Supplies were donated and substantial amounts of money were raised. Some of the donated funds were intended for the benefit of the relatives of the killed and wounded Colonial and Regular soldiers. Proceeds from organised entertainment in July at the Trafalgar Theatre raised 101 pounds for the War Relief Fund. At the same time, this was matched by another contribution of 100 pounds by the NSA. Colonel Wood also received 100 pounds with instructions that the funds were:

...to be expended as may be deemed most advisable in conjunction with the medical authorities.

In preparation for the distribution of the much needed comforts, Young quickly encountered the acute difficulty of transportation and supply, due to the loss of so many draught animals at Isandlwana and elsewhere. This situation was aggravated by the reluctance of drivers to venture long distances in broken country with a dearth of roads. Despite this difficulty, comforts and Society funds were distributed to the military hospitals throughout Natal, as quickly as possible. By the end of 1879, in addition to the funds raised in Natal, the Society had expended most of the 3,227 pounds made available, on much needed care for the sick and wounded during the AZW.

The rising numbers of sick soldiers from the beginning of the campaign could not be initially matched by increased medical, nursing and hospital assistance. The medical services were so starved of help early in the war, that any professional assistance available for the overworked medical services, was welcome. The media fuelled the general disappointment, if not outrage, at the limited support for the sick and wounded. *The Morning Post* declared that:

It is, therefore, high time that those who did such wonders in the Turkish war, who treated tens and thousands of cases and saved thousands of lives, should do something for Englishmen... We therefore, confidently make our appeal to our countrymen to come forward and aid in the good work.

Since no proper effort in Britain, on the part of any existing society or group of individuals, regarding the provision of direct assistance to the sick and wounded, had been made during the war, the initiative needed to be taken. When the news of the disaster in South Africa and plight of the British sick and wounded reached the Duke of Sutherland, he quickly set up The Stafford House South African Aid Committee (SHC). On 4 June the organisation declared that:

As from the commencement of the outbreak of the war in Zululand no effort had been made on the part of any existing society, or by any association of private individuals to afford aid from England to our sick and wounded soldiers, sufferers in the war, it was suggested to the Duke of Sutherland that a strong feeling to the effect that certain assistance in an unofficial form should be given for the purpose of supplementing the Government Medical establishment in South Africa.....

This opened the door for the SHC to provide professional assistance at a time when no private organisation in Britain was able financially, or willing to provide aid to the sick and wounded soldiers. Importantly, the venture had the full support of General Sir Garnet Wolseley and his wife, which added much needed credibility. On 4 June 1879, the decision was made to dispatch trained nurses and a supply of medical comforts, for the use by the military hospitals. The principal aim was to work with the AMD and it was impressed that the support was intended to be cooperative, without obstruction or conflict of any type. Prior to the Anglo-Zulu War, British aid organisations primarily involved themselves in conflicts between

other nations. The Duke of Sutherland echoed the prevailing public sentiment in his conclusion of the SHC Report, by stating that:

should England again be unfortunately called to arms, no time will be lost in organising committees...and that no intimation given on the part of Government officials that such assistance is not required will be listened to by the public, or any effort relaxed to mitigate the aid of private efforts the sufferings of our soldiers during war.

The Committee was advised by the AMD that it was pointless sending more surgeons and ambulances to South Africa, since 158 medical officers and 42 civil surgeons had already been appointed. In addition, the 400 hospital attendants serving with Chelmsford's forces were considered sufficient, together with the abundant hospital supplies, enough to cater for an army of 50,000 men. However, the AMD did not object to a supply of blankets and the deployment of nurses. A total of 6,201 pounds was raised by the SHC within a short period. Donations were received from a wide cross-section of society, which included titled and the upper class, tradesmen and servants.

Weeks before the arrival of any nurses from England, two sisters of charity volunteered to work in Pietermaritzburg, until they were later relieved. The National Aid Society was active in procuring more much needed nursing staff, with the cooperation of Surgeon-General Woolfryes. In April, Deputy Commissary Young arranged with the Bishop of Bloemfontein for the services of four sisters, to assist at the military hospital in Ladysmith. At a time when Woolfryes was concerned with the insufficient number of available medical staff, Young reported to the National Aid Society, that based on his observations, medical services were satisfactory at the Base Hospital in Ladysmith. Young's reports to the Society, did not reveal the full extent of the plight of the sick and wounded. He may have been unaware of the predicament and heavy workload of the medical officers, particularly along the coast during the conflict. Increasingly, the value of nursing services made its mark. More volunteers were sent from among the sisters of All Saints Church in Capetown; all were assigned to the stations at Durban and Pinetown. The entire assembly performed admirably and their self-devotion and unremitting attention to the sick and wounded won praise by all. Further assistance was offered by a small team of medical and nursing volunteers from Mauritius, headed by Lady M.A. Barker, who was keen to contribute towards the recovery of the sick and wounded. However, the aid never materialised. Towards the close of the war, the Stafford House South African Aid Committee contingent finally arrive in South Africa. The much needed party of seven female nurses, under the command of their Commissioner, Surgeon-General Ross, were quickly assigned to their posts. These young ladies were dispersed between Durban, Pietermaritzberg, Ladysmith, Newcastle and Utrecht. The AMD organised a separate group of seven nurses from Netley, headed by Mrs Jane Deeble and were duly employed at Durban, Pietermaritzberg, Newcastle and Middleburg. Woolfryes somewhat resented competition and clearly favoured the Netley contingent, reflecting this feeling in his official report with his praises, describing their excellent service as:

duties performed most zealously and efficiently, and their example of devotion to their duty having a most beneficial effect upon the orderlies of the AHC.

By omission, the Surgeon-General deliberately played down the contribution of Ross and his seven angels of mercy, in his report to HRH The Duke of Cambridge, by remarking that:

those belonging to Netley under Mrs Deeble and of the religious Communities did much excellent work and contributed very materially by their tender care and faithful nursing to alleviate the suffering of the sick and wounded. I may add that by their example they stimulated the Hospital Orderlies to practice with zeal in the performance of their duties.

Woolfryes' compliment towards the Stafford House group was not so remarkable, with their contribution considered to be somewhat diminished, as simply being 'of great use and much appreciated.' Despite the Surgeon-General's biased view, without question, all the nursing volunteers played key roles in the care of those in need. Their high standards and commitment reflected their devotion and training. Without their combined assistance, thousands of sick and wounded British regular troops, colonials, native irregulars and Zulus were cared for, in circumstances where otherwise, the system would have been easily overwhelmed and broken.

Although too late to be of assistance to Chelmsford, a stretcher-bearer company was sent to South Africa. This new unit was quickly put to the test, when the company was involved in the storming of Sekukuni's stronghold in November 1879. The conduct of the stretcher-bearers was deemed exemplary,

under the command of Surgeon-Major J Hector. General Sir Garnet Wolseley was impressed and remarked on the organisation and efficiency of the unit. A report in the *British Medical Journal* stated that:

The medical arrangements were made by Surgeon-Major Kerr, Senior Medical Officer of the force. Major Hector of the stretcher-bearer company of the Hospital Corps and Surgeons Frazer, Martin and Lloyd were detailed for duty. On November 15th, Sir Garnet held an inspection of the bearer company in their stretcher-bearer drill, and expressed his satisfaction with their efficiency and appearance. At the attack on Sekukuni's stronghold, the organisation and working of the bearer company in time of war were tried for the first time: and Sir Garnet was much pleased with the assistance thus rendered to the wounded, and by their prompt transfer on stretchers to the sick-ambulances in charge of Surgeon-Major Johnston at a convenient distance from the enemy's fire.....The black troops wounded were treated locally: and Surgeon-Major Hector left for Middleburg, the base-hospital under Surgeon-Major Comerford, with the wounded white soldiers in mule-ambulances, on November 30th.

Among the wounded in the action, 31 whites and 81 black troops required attention, which certainly offered the bearer company the opportunity to finally demonstrate efficiency and purpose in a combat arena. The formation of the stretcher-bearing companies by the British army was a step in the right direction along the long road to the development of a strong army medical service.

The cloak of Aesculapius and the mantle of Mars

Under the sub-tropical conditions of colonial warfare in Zululand, army, naval and civilian surgeons were constantly challenged by the often insurmountable numbers of sickness cases among the troops, in addition to the associated workload. Adaptation to the circumstances and ceaseless effort was necessary for all medical and hospital personnel, in order to provide an acceptable level of care. At the same time, these men were not immune to battlefield risks and disease. In describing his personal experiences during combat in 1879, Dr Andrew Duncan, a civil surgeon, befittingly described the responsibilities and perils of medical officers under fire:

Albeit the non-combatants in the army are honoured with but a slender modicum of glory, they very often come in for a lion's share of the danger. Bullets cannot discriminate between the fiercest of enemies and the messenger of balm and healing, and will tear through the middle of a gonfalon blazoned with the Geneva cross as readily as through a regimental flag. The surgeon non-combatant though he requires a courage of a higher order than his fighting associate; he has to perform the most difficult and delicate of operations under fire, and has to preserve his coolness all the time. As a rule he shrinks from no self-sacrifice; he works with quiet brave perseverance through the long watches of the night, while others are taking their repose; and in the heat of combat is generally like to that of the gallant Reynolds at Rorke's Drift.

Woolfryes summarised the difficult conditions and circumstances encountered by his staff in the coastal belt of Zululand and Natal, by stating that:

The duties throughout the campaign were severe and unremitting, especially those of the Medical Officers of the 1st Division.....owing to protracted occupation of entrenched camps on the Coast line between the Tugela & Inyezane rivers- a district proverbially unhealthy from its marsh mists, etc & indifferent water supply- suffered from exceptional sickness & mortality, the result of the conditions above with fatigue & exposure superadded.

The tragic deaths of Surgeon Major Shepherd and Civilian Surgeon Cobbin are well documented in accounts of the Anglo-Zulu war, though the loss of other medical staff has not been given the same attention and are therefore, less well known. These include Acting Surgeon Brice, attached to the NNC and killed at Isandlwana. Civil Surgeons A.A. Woods and G.H Garland both died from disease during the campaign. Surgeon-Major Allcock was invalided to England a month before the invasion of Zululand; Surgeon-Major W. J. Ingham and Surgeon-Major W. E. Dudley were both sent home on sick leave in May and June respectively. The non combatant role of the men of the AHC changed in light of the constant danger of Zulu attacks on the convoys of wounded after Isandlwana. The issued ceremonial sword bayonet was all but useless in defence, so the men were each armed with a revolver, as a very necessary precaution.

The Corps too, suffered its fair share of losses during the campaign particularly at Isandlwana where Lieutenant of Orderlies, Arthur William Hall and ten enlisted men, died in action. By the end of hostilities, another Corps officer and nine men had died of disease, seven of whom served in the coastal area of Zululand. A further 29 members of the Corps were invalided to England.

The case of Staff-Surgeon Longfield, HMS *Tenedos*, serving with Chelmsford's relief column and critically wounded at the Battle of Gingindhlovu on 2 April 1879, is interestingly significant. His experiences both as a medical officer and patient throughout the following three months, gave him the unique opportunity to assess the merits and shortcomings of the complete system of medical services provided for the sick and wounded of Pearson's Column. This did indeed reflect the overall organisation and level of care, rendered by the medical services during the entire campaign, up to that point in time.

At the height of the battle at Gingindhlovu, while attending to a wounded private of the 99th Regiment, Longfield was severely wounded in the right arm by a large spherical ball. This had entered the arm immediately below his deltoid muscle causing a comminuted fracture of the humerus. The naval surgeon was quickly removed by Staff Surgeon Shields. Upon examining his colleague on 10 April, Norbury's assessment of the wound was guarded, as he thought Longfield might lose his right arm. By the end of the month, a discharge was noted through the soft tissue wound, which seemed to be healing, with Norbury contemplating a surgical procedure to repair the broken bone. A month later pieces of dead bone had worked their way through the skin which made the removal of fragments easier. By the beginning of June, Longfield felt that good progress at last was being made and that a new splint seemed to stabilise the arm sufficiently for further optimal healing.

Now a patient, Longfield's experiences were reflective of the deficiencies and inefficiencies plaguing the medical services. In a report to his superiors, he wrote that:

When I came to my turn to be dressed, I found to my astonishment that no splints save ordinary wooden ones had been brought, four of these had consequently to be applied, though owing to the height to which the fracture extended they afforded little or no support. From the 2nd to the 7th I lay under a tent in the laager at Gingindhlovu, the conditions of which had become almost pestilential.

At my earnest request shortly before my removal thence the four splints were taken off and a hastily improvised angular one, composed of two strips of dial tied together with a piece of cord substituted for them. This subsequently from its want of rigidity proved more of a curse than a blessing.

On the morning of the 7th I was placed in an Ashantee cot and carried about a mile to a crowded entrenchment, where I was left to endure the heat of a broiling sun all day as best I might, the arm then being greatly swollen and in a highly inflamed state with much sympathetic constitutional disturbance. At sunset I was lifted in the cot on to some straw in a springless wagon in company of an officer of the 57th Regt who was suffering from a fracture of the fibula.

The following morning at 2.00 am I was roused out of a sleep induced by a strong subcutaneous injection of morphia by the wagon being jolted downhill at a good pace causing me most undesirable torture. At length the driver succeeded in arresting his refractory oxen and we proceeded more quickly. No care or attention on his part could mitigate the horrors of that terrible journey which lasted from 2.00 am to 9.00pm broken by one short spell to give the oxen a rest and which for miles led straight across country. As darkness fell and there was no possibility of selecting our road our sufferings were proportionately increased until at last from the long continued pain my senses appeared to become blunted the ends of the bones could grind together without an effort on my part to prevent my doing so. I may say that I was informed that the ambulance would have jolted me even more severely owing to the disselboom having been broken at any rate the experiment was never tried.

It is with much regret that I have been testimony to the utter inefficiency of the whole arrangements for the sick and transport of the wounded of this column and to the apathy and indifference with which effort is met which has for its object its amelioration of the sad state of affairs. Had we been flying before a victorious enemy, or had time been pressing, there might have been some little excuse for the treatment we received: but such was not the case. The Zulus were broken and fled in all directions and a garrison was left in the vicinity of Ginginhlovo. There was nothing therefore to prevent our being allowed to remain till some measures had been taken to provide proper transport for at least the most severely wounded. The day before we started no rations were supplied to the sick nor were they on the day of their coming in and how the poor

fellows fared who prosecuted their journey to the Base Hospital at Herwen will be apparent from the following extracts from a letter which I have received from the officer who shared the wagon down with me.

“If you are at all comfortable where you are, don’t attempt to come to this place. The food is bad what little there is and there is a most hellish row kicked up day & night. I think it was very lucky that you stayed at Tugela. I assure you that the journey was enough to kill any man in fact it did kill one, he was found dead in the wagon in the morning.”

Arrived here, (Fort Tenedos) appliances of all descriptions were found to be as scarce as they were at Ginginhlovo. The Field Hospitals at Forts Pearson and Tenedos could not supply between them an ounce of carbolic acid, and I had to wait several days before this was sent to me thro’ a private source in Durban. I was no stranger however to such shortcomings as these, after an experience of two and a half months in charge of what goes by the name of a Field Hospital, an experience which taught me that the urgent demands for Medicines and Appliances would in nine cases out of ten would be treated with supreme indifference and that Forms and Returns were considered of far more importance than the wants and requirements of the patients who came under my charge. I can safely affirm that this great camp at the present moment does not contain one ounce of castor oil nor a grain of acetate of lead (Dysentery & Diarrhoea) being everywhere prevalent & I hear complaints of Medical Officers of every branch that it is quite impossible for them to treat their sick for the simple reason that there is nothing whatever to treat them with. This as I have said before is nothing new.....

By 12 June, Norbury reported that his colleague Longfield, had been transferred to the Base Hospital at Durban, to convalesce and that the wounds were healing well, with a more certain prognosis long term. The Staff Surgeon would soon be invalided back to England after he was granted a pension certificate.

Surgeon Blair-Brown fell victim to disease and contracted the prevailing fever at Helpmakaar. He was sent to Ladysmith to recuperate, after which he stayed to administer the base hospital. The continued losses of able medical officers and AHC personnel, constituted a severe blow to an already overstretched medical service, which was difficult to remedy.

In this arduous environment especially in the line of fire, military and civilian surgeons were expected to wear the cloak of Aesculapius and carry the mantle of Mars, in performing their duties. This became obvious to all when among other feats performed by the AMD, medical officers were awarded the Victoria Cross. At Rorke’s Drift, Surgeon James Henry Reynolds deservedly earned himself the esteemed distinction. Another recipient of the medal, Surgeon-Major Edmund Baron Hartley was recognized for his bravery at Morosi’s Mountain in June 1879 while serving with the Cape Mounted Rifles. Separate from the Zulu conflict, a simultaneous sideshow developed in South Africa known as the Basuto War. Hartley demonstrated his act of courage:

..... in attending the wounded under fire, at the unsuccessful attack on Morosi’s Mountain in Basutoland, on the 5th June 1879, and for having proceeded into the open ground, under a heavy fire and carried in his arms, from an exposed position, Corporal A. Jones of the Cape Mounted Riflemen, who was wounded. While conducting him to a place of safety the Corporal was again wounded. The Surgeon-Major then returned under the severe fire of the enemy in order to dress the wounds of other men of the storming party.

In lobbying the War Office for recognition, respect, adequate pay, benefits and parity in rank with line officers, medical staff would at last, be able to justify their claims publicly, in clearly demonstrating their importance. Furthermore, at the Battle of Kambula, the exemplary conduct of the surgeons and members of the AHC, under adverse and challenging conditions, was also noted and furthered the cases of both the AMD and NMD. The performance of the medical officers and civil surgeons was praised by Woolfryes in his reports. Civil Surgeons Jolly and Connolly risked their lives during the retreat from Hlobane; their bravery described aptly by Woolfryes:

They were last in the retreat back to the camp when pursued by many thousand Zulus and they frequently dismounted and assisted the wounded and helpless men at their imminent risk.

The next day, the Zulus, fresh from a great victory at Hlobane, launched an aggressive and relentless attack on Wood’s defensive position. The medical services were further tested and all involved performed well:

Civil Surgeon Jolly and two orderlies, AHC, was with the garrison in the fort during the attack, and rendered valuable aid to the wounded there. Surgeon-Major O'Reilly, Surgeons A.L. Brown and Thornton, Civil Surgeon Connolly, and Hospital Dresser Armitage remained at the field hospital in the camp. The field hospital from its position was exposed to a severe cross fire, most of which fortunately passed over head, but several of the hospital tents were struck by Zulu bullets. Surgeon-Major O'Reilly reports, Surgeon A.L. Brown and Thornton and Civil Surgeon Connolly laboured hard during the whole engagement attending to numerous wounded, by whom our resources were severely taxed. An Amputation of the upper arm was performed by Surgeons Brown and Thornton in a very exposed part of the camp during the hottest part of the fight. Colonel Wood in his despatch after the battle says, "The wounded were cared for most promptly by Surgeons O'Reilly, L Brown and staff generally under fire.

At the Battle of Ulundi, the field hospital located inside the square, was situated closest to the heaviest fighting, with all the medical and support staff performing admirably in giving aid to 101 wounded men. The Natal native stretcher bearers were kept busy and they too suffered casualties, though only a few deaths were actually recorded in the records and literature.

The attitude of the AMD towards the use of civil surgeons and civil practitioners was mixed and at times, certainly not complimentary in the early part of the campaign. However, despite the criticisms, the civilian medical volunteers performed well in general, particularly at Hlobane and Kambula. Civil Surgeon Lewis Reynolds too, demonstrated the value of his colleagues and was even asked to report on the proficiency of the new medical arrangements, compared to the old regimental system. Those civilian surgeons, unfamiliar with military medicine protocol and the need for improvisation, soon learned to adapt. In performing their duties, Woolfryes gave credit to the medical officers and civil surgeons in his report:

I feel it incumbent upon me to state that the duties were performed such zealously and efficiently by the officers, AMD and the Civil Surgeons in many cases to the detriment of their health which broke down from over-work.

The contribution of the Navy's medical officers throughout the campaign cannot be understated. By acting in a well organised and self-reliant manner, their conduct and support of the AMD reflected well on the Navy. However, in his official reports, Woolfryes omitted pertinent facts regarding the vital role played by his naval colleagues both in the zone of active conflict and in the care of hospitalised army personnel. Given that the Chelmsford's army was waging war on natives whose principal weapon was a stabbing spear, it might sound surprising that the vast majority of wounds presenting for treatment were in fact bullet wounds. Assegai wounds were found to be less common due to the very deadly nature of hand to hand combat. At the British camp at Kambula, Surgeon-Major O'Reilly attended to only 5 wounded survivors from Hlobane.

At the beginning of the campaign, the Zulus possessed chiefly old inaccurate Tower flintlock and percussion muskets, while quite a few prominent members of the tribe possessed modern rifles. After Isandlwana, the cache of captured Martini Henrys bolstered the Zulu firepower, with potentially devastating consequences for the British. The quality of the ammunition, which included conical spherical for the Martini Henrys and spherical ball mostly hammered and irregularly shaped from pieces of lead, used for the varied types of antiquated firearms, caused a variety of bullet wounds. The generally poor understanding of the use of modern firearms by the Zulus arguably benefited the British in combat, particularly in view of the large number in possession, especially immediately after Isandlwana. The effect of each type of bullet depended on the shape of the projectile and range of discharge. While the Martinis were very much deadly at long range, the muskets were mostly fired at ranges less than optimal to cause significant damage. With less effective fire, most hits on the British troops caused mostly superficial wounds, requiring simple treatment with uncomplicated recovery. However, the Martini Henry bullets tore at the flesh and smashed bones. The unfamiliar use of the firearm resulted in often inaccurate fire which helped prevent higher casualties among the British in the post-Isandlwana period. Nevertheless, despite the poor marksmanship of the Zulus, many shots could not fail to make their mark amongst the massed ranks of redcoats, particularly at Ulundi, where Chelmsford's square was exposed in the open. The field hospital located inside the defensive position, was situated closest to the heaviest fighting, with all the medical and support staff performing admirably giving aid the wounded. At Rorke's Drift, Kambula and Gingindhlovu, most of Chelmsford's men hit by Zulu gunfire, sustained wounds mainly to the head, neck, chest and arms due to the protection available in the defensive positions.

The theory of germ-based disease in mainstream medicine had been gaining momentum in the 1870s, to the extent that Listerism and the use of carbolic acid for antiseptics had effectively reduced the incidence of infections in wounds. During the Anglo-Zulu war, the use of carbolic acid was deemed a necessity by the medical officers. While complete antiseptic treatment of wounds was impossible on campaign, Surgeon-Major Charles Cuffe, serving with Wood's Flying Column reported that the chemical was very effective for the purpose intended. By understanding the importance of antiseptics, Surgeon Blair-Brown, a pragmatic medical officer, also advocated personal cleanliness and thorough instrument washing. He also favoured the new elastic ligature or bandage technique as a tourniquet taught by Professor Esmarch. The standard yet old fashioned method, involved the use of the belt, buckle and pad type of tourniquet which was more uncomfortable for the patient.

As a proponent for the benefits of fresh air in surgical treatment, Blair-Brown was particular in treating severe gunshot wounds in a well pitched marquee with adequate ventilation. He felt that stuffy enclosures such as huts, which were often the only facility available for surgery and recovery patients, were sources of contamination and subsequent infection. He also preferred to use simple techniques in performing surgical tasks, as he felt that simple oiled silk sutures, drainage tubes made from dark vulcanised India rubber and borax were basically all that was usually necessary. His technique for surgical closure of wounds was usually uncomplicated, with minimal interference during the critical healing process, which allowed for optimal results. Furthermore, Blair-Brown believed that AMD personnel understood the treatment of war wounds, better than their civilian counterparts. He commented on the nearly overwhelming weight of his responsibilities following the Isandlawana disaster, and the loss of his senior colleague, stating that a total of 646 medically treated wounded regular and colonial troops were assigned to his care at Helpmakaar. It is almost certain that this group included both sick and wounded, as his figure exceeds the total official number of wounded for the entire campaign.

Surgical procedures performed during the AZW were mostly successful, unless patients died from loss of blood and shock during the operations. However, surviving the post-surgical healing period would be the challenge. Before the advent of antibiotics, secondary infection would take the lives of many patients. Gangrene and painful erysipelas or cellulitis worked to kill the chances of wound healing and while every precaution was taken to prevent these complications, they were difficult to treat. For the ligation of damaged large blood vessels, silver wire was popular though catgut would later reach prominence as the quality improved.

Today, the use of general anaesthetics is commonplace in surgery. In the 1870s, nitrous oxide, ether and chloroform were all available to surgeons. This marked a leap for medical advancement which was not entirely embraced enthusiastically by all medical officers in the British army. While the use of safer anaesthetics namely nitrous oxide and ether required bulky equipment, chloroform was easy to transport and administer. Although some medical officers felt that pain was an integral part of any surgical treatment, chloroform was extensively used during the Anglo-Zulu war to facilitate surgical procedures, especially amputations, removal of bullets and bone fragments. Surgeon-Major J.H. Porter strongly advocated the use of the anaesthetic, calling it:

one of the greatest blessings and should be carefully treasured by the army surgeon and no waste allowed.....every drop is worth its weight in gold.

Immediate or latent shock and loss of blood pressure was a recognized complication of severe wounds and surgery due to haemorrhaging or blood loss. The signs and symptoms were well understood, though effective treatment was in generally nothing more than a cookbook approach and involved administering consolation or encouragement, cordials, beef tea and wine or brandy.

The veterinary medicines available for Fleet Surgeon Norbury during the siege at Eshowe included vital opioids, opiates, aloes, diuretics, purgatives and linen for bandages Norbury also turned to natural products to augment his diminishing supplies of medicines. He used parts of the bark of the waterboom tree readily available close to the fort at Eshowe. He managed to extract tannic acid from this product which worked well as an astringent, though the Zulus used the medicine as a purgative. Ironically, the surrounding area was in fact very rich in natural medicines, which have always been highly regarded by the Zulus for their healing powers. The Dlinza forest is located three miles from the besieged garrison and arguably, through no fault of his own, Norbury missed a great opportunity to capitalise on the availability of such materia medica.

According to official records, it can be determined that a total of 191 medical officers and civilian counterparts served in South Africa in 1879. Army Medical Department medical officers serving with the

Regular forces, including those holding command or administration posts, totalled 84. Twenty-one of these did not arrive in Natal until after the victory at Ulundi. There were 49 civil surgeons on contract with the AMD to serve with Chelmsford and a further 15 civil practitioners were recruited. Eighteen medical officers and civil Surgeons served with the Colonial forces, of which 9 did not participate in the Anglo-Zulu war, though they were engaged with units involved in separate conflicts. The Stafford House South African Aid Committee sent two medical personnel and the Naval Medical Service contributed a total of 23 medical officers in various capacities. Of the latter, nine naval surgeons served directly with the Regular forces, though officially, their primary responsibility lay with the health and welfare of the men belonging to the Naval Landing Brigade. The loss of 15 medical personnel by the end of May 1879 by attrition, due to deaths, disability, wounds and resignations upon expiration of contracts, were an inconvenience which severely dented the efficiency of the medical services. In addition to these losses, some succumbed to the prevailing sickness and were therefore, temporarily disabled. At the height of efficiency of the medical services, the total effective strength of the AMD, supported by other departments and volunteers, likely never exceeded 130 medically trained staff.

On campaign in South Africa, pragmatism and resourcefulness were expected from all medical officers in the face of arduous circumstances and continuous demands placed on their shoulders. Surgeon-General Woolfryes never wavered in his tasks and commitment to an efficient medical service. Notable contributions by the surgeons, nurses and supporting bodies, were made to the advancement of contemporary medicine. The establishment of the profession as an important service to the British army and navy was a reflection of the quality of the men and women involved. Surgeon J.H. Reynolds and Surgeon-Major Hartley were rewarded for their valour while other colleagues were noticed for their bravery in the face of the enemy. By demonstrating the use of perceived sound principles in promoting a high standard of medical care and applying themselves to the advancement of their profession, further notable contributions were made. In aiding the recovery of sick and wounded Surgeons-Major Blair-Brown and Shepherd, Fleet Surgeon Norbury and Civil Surgeon Stoker, amongst others all played significant roles. At times during the war, good medicine and life-saving measures were achieved for the wrong reasons, given that contemporary thinking and lack of microbiological knowledge was waiting for the next step forward.