Review Article

Control of epidemics in the Roman army: 27 B.C. - A.D. 476

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ABSTRACT

During the Roman Empire thousands of soldiers were exposed to communicable diseases. The Romans forged a military medical system that surpassed the medical systems of most of their enemies. Under the principles of immediacy and expectancy, the Roman medical staff salvaged and returned to duty many sick and wounded soldiers as rapidly as possible. The selection of and training of healthy legionnaires, hygiene and sanitation and immediate medical care emphasized that the timing of care after diagnosis is as important as the quality of care. The Romans were the first army in history to employ medical corpsmen, field hospitals and triage. The Roman efficacy in combat medicine may be one of the least appreciated aspects of the ability of the Roman army to help create and maintain an empire.

Keywords: Epidemic, Immediate medical care, Hygiene, Sanitation

INTRODUCTION

War is a military conflict conducted by armed forces between or among countries, within countries or involving nationalistic or asymmetric groups. The ultimate purpose of warfare is to inflict unacceptable casualties upon to secure a victory, armistice or truce. Many military personnel suffer traumatic injuries of various kinds through the use of weapons by the combatants. However, studies by Gabriel, and Metz demonstrate that until the 20th century, more soldiers died from disease than from enemy weapons.¹

The main purpose of this article is to demonstrate that through careful selection of healthy soldiers, hygienic practices, isolation of infected soldiers, advanced treatment, and a primitive understanding of epidemiology Roman armies could minimize the ravages of common epidemics. The use of field hospitals, triage and medical corpsmen on the battlefield were important elements in

the early treatment of infectious diseases. The key question being addressed is the efficiency of Roman medical care in reviving sick legionnaires for reentry into military conflict. Critical source information is extracted from Greek and Roman historians, physicians, Roman artifacts, monuments, paintings, archaeological discoveries, and attention to modern secondary sources. The main inference is that Roman combat medicine in addressing communicable diseases was superior to the combat medicine in addressing communicable diseases practiced by many Roman enemies. Some armies, particularly Babylonian, Greek, Assyrian and Egyptian, developed excellent techniques for use in combat medicine, but medical corpsmen, triage and field hospitals were Roman innovations.

The key concepts to understand in this article are "immediate medical care," "military medicine" and "epidemics." "Immediate medical care" means care rendered soon after a wartime injury by caregivers and

hospitals located near the battlefield.² “Military medicine” means medical assistance rendered to a wounded soldier with a “primary goal of reducing manpower losses caused by an enemy.”³ “Epidemic” is an infectious disease or condition that attacks many people at the same time in the same geographical area.⁴ The main assumption is that without the role of excellent medical care, the Roman army could not have forged and maintained an empire which encompassed two million square miles, 44 provinces and 40 million people. Following this line of reasoning, the implications are a better understanding of Roman successes in warfare. Failure to take this line of reasoning seriously, leads to a lesser understanding of Roman military successes in warfare. The main point of view presented in this article is that the immediacy of treatment by medical personnel in the field (capsarii) and field hospitals (valetudinaria) was an important aspect of providing care to legionnaires soon after discovery of a contagious disease. Roman camps (castrae) or forts (castella) occupied an area of about five acres, in addition to the fortified ditches, stockades and other defensive devices that surrounded them.⁵ The average Roman hospital occupied an area of 6,000 square feet and it could accommodate between 250-500 patients. In the event of epidemics, isolation ward tents could be set up near the hospital.

PRIMARY SOURCES

Cornelius Celsus (first century A.D.) who wrote a manual of wound surgery, Pedanius Dioscorides (A.D. 40-80) who compiled an extensive catalogue of medicinal products and their uses, Claudius Galenus (AD 129-c.199) compiled a systematic approach to medical procedure, and Flavius Renatus Vegetius (4th century A.D.) who discussed sanitation and hygiene at military encampments and preserving the health of soldiers. Theodorus Priscianus (4th century A.D.) wrote a study about skin diseases and wounds and Quintus Gargilius Martialis (3rd century A.D.) specialized in dietetics, including foods useful to helping wounds heal and those possessing analgesic properties. Pliny the Elder (A.D. 23-79) recorded a valuable collection of pharmaceutical formulas.⁶

COMMUNICABLE DISEASES COMMON IN ANCIENT ROME

During the reign of Emperor Gaius Octavian Augustus (27 B.C.-A.D. 14), the Roman army consisted of 25-28 legions. A legate commanded a legion of 5,000 men, cavalry and auxiliaries. He was assisted by six tribunes, 60 centurions and a number of noncommissioned officers. The legion had a number of support personnel including medical personnel. Medical personnel were excused from regular fatigue duties, except in emergencies. Between 27 B.C. and A.D. 476 Roman military medicine reached its zenith.⁷ The huge empire which included Western Europe, North Africa, the Middle East and beyond exposed Roman legionnaires to

many endemic infectious diseases.⁸ Claudius Galen (A.D.129-200), perhaps the greatest physician (medicus) in Rome, describes symptoms compatible with typhus, malaria, schistosomiasis, typhoid, smallpox, and various dysenteries. Judging from the amount of attention Galen devotes to dysentery it must have been one of the most common epidemics threatening the ancient Roman army.⁹ Another renowned physician, Cornelius Celsus (25 B.C.-A.D. 50), also wrote about descriptions of diseases compatible with the aforementioned infectious diseases.¹⁰

EPIDEMIOLOGY IN ANCIENT ROME

Roman physicians knew little about microbiology; however they were aware that diseases could be spread throughout a group.¹¹ Some physicians received advanced training at one of the medical schools located at Cos and Cnidus, near Athens, Greece or Alexandria, Egypt. For example, the Greek physician Hippocrates (460-370 B.C.) studied at Cos and Galen studied at Alexandria.¹² Greece and Egypt became provinces of the Roman Empire and therefore these schools were available to young patricians who wished to study medicine in those provinces. Roman physicians knew through deductive reasoning that pathological microorganisms existed. Marcus Terentius Varro (116-27 B.C.) wrote: “the pathogen is alive, too small to be seen; it enters the body through the mouth and nose, propagates, and produces many diseases resistant to treatment.”¹³ Thucydides (460-400 B.C.) noted that people who had recovered from some specific diseases could care for the sick without contracting the diseases a second time.¹⁴ The Romans had no way of distinguishing among the viruses, bacteria and other pathological organisms which cause epidemics. Mithridates VI of Pontus (131 B.C.-63 C.C.) is the first known person to employ the principle of artificially acquired active immunity. He practiced taking increasing amounts of small quantities of toxins into the body in order to induce a tolerance to larger doses of the same substance.¹⁵ Soldiers with innate immunity, perhaps due to experiencing a subclinical reaction to a disease, or those with natural active immunity to a disease would have been useful during epidemics of the disease as hospital personnel. However, there is no known evidence to support that legionnaires were employed in this way.

ROMAN STRATEGIES FOR ADDRESSING EPIDEMICS

In an era when wounds were the most common in firmament encountered on a battlefield, it was critical that medical personnel be proficient in treating all types of wounds. Capsarii (medical corpsmen) received training to render advanced first aid to wounded legionnaires. They carried first aid kits containing dried aloe for use as an anti-hemorrhagic, acetum (vinegar) for use as an antiseptic, and henbane seeds (*Hyoscyamus niger*) in an ointment prepared with wool fat (lanolin) for pain. They also carried bandages made of linen and wool. (absus) Sick or wounded soldiers, unable to walk were evacuated by

stretcher or wagon pulled by horses to the field hospital (valetudinarium).¹⁶

RECRUITMENT AND TRAINING OF LEGIONNAIRES

Service in the Roman legions was limited to Roman citizens. Non-citizens could serve only with auxiliary units. Roman physicians examined a potential recruit's face, eyes, pulse, temperature, respiration, feces, sputum, urine, range and motion of joints and other tests. If he passed the physical examination the recruit appeared before a board of officers, which included one or more physicians. The Selection Board interrogated the recruit for his physical, mental and moral integrity. The age limits were between 16-35 years. Younger recruits were given preference. Older recruits usually had skills not found in the younger population but were of vital success to the army. Examples were physicians, surgeons, engineers, seplasiarii (pharmacists specializing in the preparation of administered medicines), architects and musicians.¹⁷ These soldiers known as immunes were exempt from ordinary fatigue duties. The ideal height for a potential legionnaire was 5 feet 10 inches. Recruits from rural areas were preferred over those from urban areas. Only the more intelligent healthiest applicants were selected.¹⁸ Vegetius wrote: "So let the adolescent who is to be selected for martial activity have alert eyes, straight neck, broad chest, muscular shoulders, strong arms, long fingers, let him be small in the stomach, slender in the buttocks, and have calves and feet that are not swollen by surplus fat but firm with hard muscle."¹⁹ Men of this description were more likely than not to have strong immune systems which would help them regain health after illness.

Recruits inducted into active military service served as a probatio (probation status). These recruits underwent an arduous basic training schedule for three or four months. There were frequent cadence marches (militaris gradus) of 20 miles and forced marches (plenus gradus) of 27 miles which they must complete in five hours carrying 60 pounds of equipment. Training consisted of practice with swords, shields, javelins slings, and shifting battle formation. Other training included: running, swimming, mounting horses, digging ditches, erecting ramparts and palisades and building camps, bridges, roads and walls. Recruits who successfully completed these drills to the satisfaction of the prefect of the legion, tribunes and other officers recited the oath of sacramentum and became a regular legionnaire. Those who failed to successfully complete these drills were discharged from military service. Archers and catapultiers received advanced training in the use of these weapons.²⁰ Survivors of this strenuous training period probably had strong immune systems.

HYGIENE AND SANITATION

Hygiene and sanitation were regularly practiced in all military encampments, especially hospitals. Roman physicians took steps to reduce sepsis and separated sick and wounded soldiers in the hospital wards to minimize contagious from spreading among patients. In the event of epidemics, isolation wards were set up in tents near the hospital. Roman army camps were situated near streams or rivers, away from marshes, swamps and standing water. The hospital bath area was attached to a gymnasium for exercises or massages.²¹ A complex system of drains and sewers emptied into streams, rivers. Drinking water for soldiers and animals were taken from water upstream or separate from the waterway used for latrines. Wooden seats for latrines which were dug to a depth of ten feet were situated over the main sewer running round three sides of the building to discourage disease-carrying insects. A smaller channel of water, fed from the water tank was for washing sponges dipped in a mixture of water and acetum (vinegar) were used as toilet paper. Latrines also had basins for washing hands.²² The Romans often recycled bath water by using it as part of the flow that flushed the latrines. Sanitation facilities The Roman army took great care to construct sanitary facilities and segregate them from water, food supplies and dining areas. When water was in short supply lime pits were used in the latrines. Roman physicians recognized that fomites could spread disease. They washed clothing, blankets, woven materials and saddles before recovered soldiers returned to active duty.

The Roman soldier practiced hygienic measures. Celsus recommended recreation, rest, and a varied diet in include fruits, vegetables, wine diluted with water, boiled meat as part of the diet. He also recommending exercise, daily gargling with salt water, frequent bathing and shaving the face. Mosquito netting was furnished to all patients and hospital personnel whenever needed. Daily drills and marching helped to keep the soldiers fit. Legionnaires were subject to periodic medical examinations, and could be discharged from service with retirement benefits if they suffered from serious physical or psychiatric conditions. Hygienic rules were a form of preventive medicine. The Romans realized it is far easier to prevent an epidemic than to address it.²³

Every night while others slept, a detachment of soldiers performed hospital police duties. The detail cleaned the entire hospital, including the kitchen, baths, latrines, surgical suite, walls and hallways. They used a mixture of Ammoniacum juice, water and vinegar as a cleansing agent.²⁴ The medicus tesserarius (hospital officer of the watch) monitored cleanliness by inspection after the work was completed. A medicus decanus (task master) ordered the specific tasks of workers on the policing detail. A separate detail cremated dead soldiers outside the camp walls.²⁵

TREATMENT OF EPIDEMICS

There were no vaccines or antibiotics to prevent or cure infectious diseases in Roman times. Therefore soldiers who contacted a communicable disease received bed rest, isolation, symptomatic treatment and a quiet, calm environment. High fever and dysentery were common problems during epidemics. Galen and Celsus spent considerable time addressing these conditions in their writings.²⁶ Convalescent staff, under the command of an optio convalescentium (physician's assistant) controlled fever in several ways. They sponged the patient with tepid water and acetum and gave them a draught containing the powdered bark of the willow tree. (*Salix alba*).²⁷ When the fever was dangerously high, the head of the patient was kept cool with ice or cold compresses, and the body kept warm with blankets. The convalescent staff treated inflammation with ice and the application of cupric acetate.²⁸

Physicians controlled dysentery through pharmacological intervention and diet. Galen prescribed the juice of goatwort (*Hypericum hircinum*) and mastic *Pistacia lentiscus*) for diarrhea.²⁹ Celsus prescribed a compounded mixture called kolikon for dysentery. The mixture contained costus, anise, castoreum, parsley, pepper, poppy, cyperus, myrrh and honey. The mixture was administered to patients in cooled hot water.³⁰ Non-pharmaceutical intervention included oral water rehydration therapy, and eating plain simple foods such as boiled eggs, baked chicken and vegetables, toast, oatmeal and barley.^{31,32} Sick soldiers often experienced pain caused by the disease. Constipation was treated with castor oil (*Ricinus communis*).³³

Pain can be classified as mild, moderate or severe. Mild pain is nagging, annoying and interferes little with activities of daily living. Soldiers with mild pain could be treated with non-pharmacological intervention and the use of a local anesthetic such as henbane seeds (*Hyoscyamus niger*) combined with opium in an ointment prepared in wool fat (Lanolin).³⁴ Broadleaf plantain (*Plantago major*) provided another form of local anesthetic.³⁵ The powdered inner bark of the slippery elm tree (*Ulmus glabra*) was used for coughs.³⁶ Moderate pain interferes significantly with the activities of daily living.³⁷ These patients require stronger medicine which might include a draught of mandrake (*Mandragora officinarum*).³⁸ Severe pain is disabling and patients are unable to perform the activities of daily living. Most post-operative patients were in this category. They usually required a draught of opium (*Papaver somniferum*).³⁹ The physicians used red wine mixed with horehound as an antitussive agent.⁴⁰

During relatively peaceful periods the medicus preferred that a patient receive adequate sleep. The somnifacient of choice was *Withania somnifera* (somnifera) (Ashwagandha) (winter cherry). The herb contains somniferine, withanasomnine and withanolides which are

hyonotics.⁴¹ The patient could be given a draught of this medicine during the evening. Unfortunately, the plant had to be imported from India via the Silk Road and was not always available. As an alternative Celsus recommends a mixture of mandrake, apium seed and seed of henbane mixed in wine as an alternative.⁴²

During battles in which the hospital was overwhelmed with triaged soldiers, the treatment of sick soldiers could be delayed. The dosages of medicines depended upon the patient's body mass, age, physical condition and the judgment of the medicus. Rain water was preferred for use in liquid medications. If rain water was not available spring water was the preferred source.⁴³ Speed was important in all medical procedures.

CONCLUSION

During the Roman Empire thousands of soldiers suffered communicable diseases. The Romans forged a military medical system that surpassed the medical systems of many of their enemies. Under the principles of immediacy and expectancy, the Roman medical staff salvaged and returned to duty many sick soldiers as rapidly as possible. Immediate medical care, including the selection and training of healthy legionnaires, hygiene and sanitation, and treatment soon after detection of a contagious disease emphasized that the timing of care after diagnosis is as important as the quality of care. The Romans were the first army of antiquity to employ medical corpsmen, field hospitals and triage. The Roman efficacy in combat medicine may be one of the least appreciated aspects of the ability of the Roman army to create and maintain an empire.

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27. Galen, *De Merhodo Medendi*, 11.9 (757-758K). Willow bark contains salicylic acid, an anti-febrile agent.
28. Dioscorides, *De Medica Materia*, 5.79, Cupric acid is a simulating local caustic.
29. Dioscorides, *De Medica Materia*, 4.5; 1.89, Mastich contains resins, which produce antioxidant, antifungal and antibacterial properties. Goatwort was applied to the rectum to provide temporary relief of an inflamed, irritated anorectal surface.
30. Celsus, *De Medicina*, 4.14.
31. Galen, *De Methodo Medendi*, 12.7-860K.
32. Galen, *De Methodo Medendi*, 7.6.-481-494K; Celsus, *De Medicina*, 4.12.
33. Dioscorides, 1.38, 4.164. Castor oil contains ricinoleic acid which is useful in constipation.
34. Dioscorides, *De Medica Materia*, 4.68.1-3. Henbane contains scopolamine and hyoscyamine which are analgesics.
35. Dioscorides, *De Medica Materia*, 2.153. Plantago major contains aucubin (an antimicrobial agent), allantoin (which stimulates tissue regeneration) and mucilage (which reduces pain and discomfort).
36. Dioscorides, *De Medica Materia*, 1, 69, 86-88. The bark contains salicin, an anti-febrile, and flavonoids which are anti-inflammatory. Slippery elm contains mucilage which is useful as an anti-tussive.
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39. Dioscorides, *De Medica Materia*, 4.64.3. Opium is a powerful analgesic containing morphine, codeine and thebaine. It also contains the anti-inflammatory alkaloid papaverine. Morphine binds to specific receptors in the central nervous system and suppresses them. Opium was imported from Egypt along the Silk Road.
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