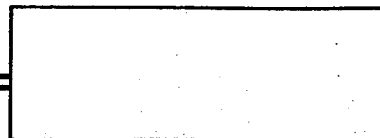


Technical Report 9504



**THE EFFECT OF SHOWER/BATH FREQUENCY ON THE HEALTH
AND OPERATIONAL EFFECTIVENESS OF SOLDIERS
IN A FIELD SETTING: A HISTORICAL REVIEW**

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April 1991

**U.S. Army Biomedical Research & Development
Laboratory**

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PREFACE

COL John Troychock, MS, U.S. Army Reserves, was assigned to the U.S. Army Biomedical Research and Development Laboratory (USABRDL), Fort Detrick, MD, as Environmental Science Officer under the Individual Mobilization Augmentee (IMA) program. The Fort Detrick point of contact for this project is W.D. Burrows, U.S. Army Center for Health Promotion and Preventive Medicine. Persons concerned with the title subject are also urged to read L.C. Hall, J.I. Daniels, R. Aly, H.I. Maibach, S.A. Schaub and L.E. Becker, "The Effect of Shower/Bath Frequency on the Health and Operational Effectiveness of Soldiers in a Field Setting: Recommendation of Showering Frequencies for Reducing Performance-Degrading Nonsystematic Microbial Skin Infections," Final Report, Army Project Order 90PP0826, AD A242923, September 30, 1991.

Colonel Troychock's military career extends from 1954 to the present with a hiatus for educational studies; his B.S., M.Ed. and Ph.D. are in Biological Science and in Public Health Management. He has been associated with the USABRDL since 1980 in the IMA program. He has completed Military Advanced and General/Staff School. His civilian position is Regional Supervisor for Food Safety and Laboratories in the State of Pennsylvania. He is a Registered Sanitarian with the Board for Registration of Sanitarians in PA (on which he sits as Vice-President) and with the National Environmental Health Association. He is a certified Epidemiologist and is certified and licensed in a number of other fields of public health. Colonel Troychock is a Diplomate with the prestigious American Academy of Sanitarians and has served as President and Vice President of the Central States Association of Food and Drug Officials. He resides in Bloomsburg, PA, with his wife and 4 children.

FOREWORD

We are all aware at this time of the serious nature of skin disease as it applies to the combat effectiveness of the soldier in a field setting. Before the Vietnam War, however, skin disease problems from lack of bathing were taken in stride as a typical problem that normally occurred in a wartime setting. Some medical men treated the issue seriously and some with no concern. Specific efforts to combat skin disease problems were haphazard. Projects to deal with skin problems were started but never finished, individual medical professionals complained to no avail, and to the greatest extent case situations evoked "come to sick call if you have a problem, get clinical symptomatic treatment and return to duty." If situations got out of hand, hospitalization or evacuation was performed on an "as needed" basis.

Matters were attended to so haphazardly that in essence very little information of significant value has been recorded. General statements were made that various skin diseases due to non-bathing were common, but that was the extent of the data (Office of Strategic Services, 1942). No higher authority recommended an intense study of the overall situation, even when statistics were indicative of a major problem that needed study and ultimate resolution. When health concerns became virtually out of control in Vietnam the problem began to be taken seriously (Allen, 1987). This was the first conflict where skin disease specialists, i.e., dermatologists with specific experience, were included in a major theater of operations. I sincerely hope this project in which I have become involved will be of benefit to the successful resolution of this serious problem.

The following facilities, agencies, interagency memoranda, personnel contacts, consults, meetings, and other pertinent contacts were included in the completion of the project.

Office of the Surgeon General (OTSG), Consultant's Division

Army War College Archives, Carlisle Barracks

Personal Contacts with the Following Agencies:

Centers for Disease Control (seven agencies contacted)

Industry Scientists (eight contacts)

Academic Institutions (four contacts)

State Agencies (five contacts)

NASA (four contacts)

Referrals from prior agencies contacted as pertinent to essential criteria (ten contacts)

There was a total of 82 articles, 22 books, 35 bulletins and 67 after-action reports reviewed and evaluated. These articles, books, reports, etc. designate the areas where data was important enough to be evaluated for utilization by the military services. The remainder of the data surveyed was not of significant relevancy to be included for discussion.

It should be stated that the most significant data obtained was through individual contacts obtained by referrals. During the final stages of the data gathering it was noted that individual contacts were being referred to me the second time around. When this occurred, I realized that the most significant contacts were already "picked relatively clean" of pertinent data.

The conclusions and recommendations noted in this project have been the sole responsibility of the author. The data obtained has been categorized with respect to facilities, agencies, interagency memoranda and personal references from private consultations. The data designated as secret has been downgraded after consults and official meetings with appropriate officials. I have tried to refrain from trade names or specific endorsements whenever possible. The study in its entirety has been conducted under the authority granted to me by the Health Effects Research Division, USABRDL, Fort Detrick, Frederick, MD. The accountability for all statements and interpretations, positive or otherwise, is mine since I had the sole responsibility for the collection, composition and ultimate conclusive summary of this project.

John Troychock, PhD, COL, MS-USAR

INTRODUCTION

The scope of this project is to critically evaluate the current, available information to assess the significance of shower/bath frequency on the health of the skin of soldiers with specific emphasis placed on maintaining combat effectiveness and subsequently, combat capability. The assessment evaluates the following:

- (1) The shower/bath frequency regime as it pertains to the beneficial health impact on the normal, healthy skin of soldiers in variable military field settings.
- (2) The shower/bath frequency regime as it pertains to skin which has been compromised, impaired, weakened or illtreated due to variable battlefield settings.
- (3) The effectiveness of soaps and cleaning compounds for removing pathogenic organisms, normal body secretions and types of adjuncts typical of a military field setting.
- (4) The psychological factors for soldiers nurtured with fixed mores for shower/bath frequency in our society.

It should be noted that after the assessment and evaluation of all pertinent data, it can be reasonably assured that no extensive clinical trial studies have been conducted pertaining to this specific problem area. The data obtained for this study are limited to technical narratives, after-action reports, pertinent anecdotal data, memoranda for distribution, interagency documents for data exchange, memoranda for commanders from subordinates, private letters and war theater histories. Documents accumulated in historical archives at the Army War College Library, Carlisle Barracks had to be gleaned individually for pertinent data and extrapolated, since the field agencies writing the narratives were short on time and personnel and were not able to elaborate extensively. The classified documents obtained from the data compiled by the North African Section of the Office of Strategic Services (1942), the Mediterranean Theater of Operations (1943), and the U.S. Army Persian Gulf Command (1942) were quite informative, interesting and also quite strange.

The report of the Persian Gulf Command, the first medical command to be established in the Persian Gulf region, was especially informative. The strange aspect stems from the fact that all responsible personnel knew of the major problems involved with skin diseases due to lack of shower/bathing facilities; however they did almost nothing at the higher command

level to solve the problem. Unit commanders were frequently ignored concerning these problems and the field soldiers had to virtually fend for themselves with makeshift devices. It was not until Vietnam that the magnitude of the problem was realized (Allen, 1987). It has been stated that when the glamor fades and the mists of war have cleared, the keen eye of history again affirms the huge impact of disease on the success or failure of military campaigns. Vietnam was no exception (Barrett, 1982).

HISTORICAL DATA I

The most significant immediate threat of disease due to non-battle injury involving U.S. troops deployed in Saudi Arabia, Kuwait and Iraq is heat related (Dept. Of Advanced Preventive Medicine Studies, 1990). The typical stresses of new harsh environments significantly compromise performance, thus diminishing combat effectiveness. Becoming acclimatized to the harsh environment depends primarily on the resistance and "bounce back" ability of the individual soldier. Dirty conditions, intense heat and, at times, high humidity predisposes troops to a variety of skin diseases. Serious command procedures for personal hygiene must be instituted. Acute skin diseases may be a serious problem if troops bathe in what they may presume to be safe bodies of fresh water. Schistosomiasis could become serious if command guidance is not followed explicitly. No large permanent bodies of water, (canals, lakes, impoundments, rivers, etc.) exist in Saudi Arabia, making oases important water reservoirs. The use of these sources could initiate serious, pathogen induced, skin diseases. Kuwait is basically a sandy, riverless desert. Sand and dust storms occur year around, and water sources are rare. (Dept. of Advanced Preventive Medicine Studies, 1990). [Note that an after-action report on the Persian Gulf War was not available at the time this report was prepared. Ed.]

Stress as a factor relating to diseases of the skin is to be considered prevalent and should be an important factor in command decisions. Data on the importance of immune response has been acknowledged, and the medical observations that follow should be considered. Concerning the immune system, the hormone cortisol plays a significant role (Jaret, 1991), having been proven to suppress the body's immune response. When an individual has been placed in a stressful environment, harsh climate, combat, etc., the blood tests for cortisol have shown a 60 percent increase from normal blood levels. At the same time the blood levels of natural protective cells, which are basically the immune system watch dogs that help fight off microbiological infections, have dropped off as much as 30 percent. The immune-suppressed

condition arising from depression of the resisters of pathogenic microorganism lasts for significant periods of time, thus enhancing the ability of the pathogens to cause an individual to become infected. Other protective antibodies are also known to be significantly reduced, thus further impairing the immune system's ability to ward off pathogens. By the time the immune system can adequately restore levels of antibodies, the pathogenic microflora may already have gained a significant threshold, thereby causing a health-threatening situation that could contribute to decreased combat effectiveness.

The harsh, hot, humid environment of the Persian Gulf combined with less than adequate hygiene could create havoc beyond comprehension, since these conditions are extremely conducive to the development of skin diseases. In the theater of operation during the period 1943-45 dermatologic diseases involved 70 to 80 percent of all sick call complaints, 20 to 30 percent of hospital admissions and 15 to 20 percent of medical evacuations from the combat area. In Vietnam skin diseases achieved distinction as the second leading cause of hospital admissions as the war progressed (Dept. Of Advanced Preventive Medicine Studies, 1990).

DERMATOLOGICAL CONDITIONS

A detailed list of dermatologic conditions found to afflict soldiers follows:

- Miliaria (Prickly Heat) - Basically a syndrome of cutaneous changes associated with sweat retention and extravasation (discharge or escape into tissue) of sweat occurring at different levels in the skin.
- Miliaria rubra - This is essentially a condition that results from obstruction to the ducts of the sweat glands caused by prolonged maceration of the skin surface. The sweat causes pruritic erythematous papulovesicles (basically a redness of skin from congestion of capillaries).
- Miliaria profunda - In this disease the sweat from the skin escapes into the middermis, producing nonpuritic (itching) inflammatory papules or small elevations of the skin which change in size with the sweating of the patient. This usually occurs as a late sequel to severe Miliaria rubra and, when extensive, leads to severe heat intolerance.
- Intertrigo - This is superficial dermatitis occurring on apposed surfaces such as creases of the neck, folds of the skin, e.g., armpit and groin.

- Tropical acne - Fundamentally a dermatitis type irritation exacerbated by heat.
- Atopic eczema - This is a chronic pruritic eruption of unknown etiology, although allergic tendency, heredity and psychogenic factors may be involved.
- Prior skin conditions - Minor skin problems that may become serious in hot, humid Middle East environments.
- Impetigo - This is basically a Streptococcal infection of the skin characterized by pustules rupturing, enlarging and crusting with elevated margins.
- Ecthyma - This is a shallow ulcerative form of impetigo usually found on chins and forearms.
- Folliculitis - This is an inflammation of the follicles.
- Fungal infections - *Trichophyton mentagrophytes*, *Trichophyton rubrum*, *Epidermophyton floccosum* and *Candida albicans* (groin and toe web infections).
- Seborrheic dermatitis - This is a chronic disease of the skin characterized by yellow crust on scalp, face, genitals and involved with intense itching.
- Pseudo Folliculitis Barbae - Basically beard follicle inflammation.
- Sycosis - Inflammation of hair follicles of eyelids or beard.
- Dermatophytosis - A general fungal infection of the skin caused by a dermatophyte, which is a typical fungus parasite upon the skin.
- Contact sensitization - Substance irritant upon contact.
- Dyshidrosis - This is an eczema of the hands and feet which blisters and ruptures, eventually leading to secondary infections. This skin disease is highest on the list of dermatologic problems for evacuation (Allen, 1987).

The Persian Gulf environment mainly induces or exacerbates previous conditions such as Miliaria intertrigo, tropical acne, atopic eczema and contact sensitization. The diseases that are

much more serious include impetigo, ecthyma folliculitis and fungal infections. Spirochaetal disease and schistosomiasis are basically caused by contact with infected waters.

HISTORICAL DATA II

Reports from the North African Section of the Office of Strategic Services (OSS) stated that skin diseases were a serious problem. They ascertained that the major problems were with white personnel; other ethnic groups were observed to experience few problems. Due to the limited access to shower/bathing facilities, most of the minor skin problems evolved into severe secondary infections. In spite of the serious problems noted, there was no significant emphasis placed on preventive medicine actions. Skin problems were treated as they appeared and appropriate medical action was taken as needed, i.e. removing combat personnel with skin problems from the fighting lines, keeping them in hospitals for several days with proper bathing, keeping them dry, providing clean clothing, and applying antibiotics or antifungal medications when necessary. Most cases returned to the combat area within 10 days. Severe cases were evacuated from the area (OSS, 1942).

Skin diseases historically constitute a leading cause of morbidity in any tropical military campaign. Unfortunately, this fact is as true in any and all campaigns as it was during the North African and South Pacific campaigns of World War II (U.S. Army Medical Dept., 1971). A specific tactical situation, such as noted in the Mekong Delta region of Vietnam, may require continuous and prolonged exposure to a wet environment, predisposing the infantryman to bacterial and fungal invasions of the skin (Allen, 1987). Over long periods, this environment caused serious specific problems, such as immersion foot (formerly called "trench foot", a condition characterized by edema, blotchy cyanosis, skin discoloration and numbness, with potentially serious sequela).

A field team from the U.S. Army Medical Research and Development Command unit located at the Presidio of San Francisco studied skin problems in the delta region of South Vietnam. Its research sought to identify the causative agents of skin disease there and to evaluate therapeutic and prophylactic measures. Preliminary studies showed that daily administration of griseofulvin was an effective prophylactic against fungus diseases of the skin, and that its use reduced incapacitating dermatophytosis in certain special military units from 36 percent to 6 percent. Follow-up epidemiological studies would have proved most beneficial at that time.

Data from the After Action Report of Operation Bright Star 87, presented below, did not elaborate adequately on showers (Bright Star, 1987). The low priority accorded frequency of shower/bathing was disappointing.

ISSUE #28: Showers.

FINDINGS: Overall, shower units were found to be in good sanitary condition. However most soakage pits could not accommodate additional water. The shower soakage pit was also an accumulation point for garbage and water.

DISCUSSION: Since there is a hardpan layer under most of the exercise locations, soakage pits could not accommodate a large amount of water. Daily shower unit sanitation and aeration cannot be overemphasized.

RECOMMENDATION: Field Sanitation Teams (FSTs) need to instruct units on the construction of soakage pits for showers in this terrain. Recommend timed showers to reduce excess water, which tends to overwhelm soakage pits. Also space should be planned to construct evaporation beds instead of soakage pits, especially if timed showers are not used. FSTs should not design small, deep soakage pits which will not allow for the evaporation of water (Bright Star, 1987).

Data from the After Action Report of Gallant Eagle, Gallant Knight 88 (1988) also had little data that could be significantly utilized. This report did not specify shower/bathing requirements as acknowledged for Bright Star 87. Although much was covered and deficiencies in a vast number of areas were described, showering was not considered significant at that time and it was not even addressed. This was another disappointment in gaining insight to the problem.

Water Supply

In World War II, the problems of water supply in the European Theater, like most features of preventive medicine, were greatly influenced by the nature of the operations in which troops were engaged at the moment, the conditions under which they were housed, and the country in which they were stationed (Gordon, 1945).

The scale for quantities of water to be supplied to troops came about by rough mutual agreement among the Army Medical Department, the Corps of Engineers, and the British War Office. The amounts were based on imperial gallons per person per day, an

imperial gallon being the equivalent of about 1.20 United States gallons. Where a water-borne sewerage system existed, 20 gallons per person per day was provided to all establishments other than hospitals, where patients were allowed 50 gallons per day. Where no water-borne sewerage system existed, all established units other than hospital patients and men living in temporary tented camps were allowed 10 gallons per person per day. Hospital patients received 40 gallons, and men housed in temporary tented camps had five gallons (Gordon, 1945).

The lack of hygiene and sanitation among the indigenous population in the Middle East has long been known. Water was a major problem in Eritrea, where potability and quantity were factors. The limited quantity of available water required strict rationing for bathing and laundry. The Italians had relied on bottled water for drinking; however, an investigation by a surgeon showed that the source of this bottled water was a highly contaminated surface spring. This source was, therefore, prohibited for use by Americans. Although an American hydrogeologist was brought to the theater, he was unable to increase appreciably the availability of water for American installations or for the native population (Army Medical Dept., 1945).

In other areas, such as the Levant, the Delta, and the Persian Gulf, water supplies were adequate for all purposes. However, since no source was found to be potable by military standards, water treatment facilities were built at all U.S. bases. No status reports regarding skin diseases from non-bathing were noted in the Middle East countries during World War II (Army War College, 1943).

Bathing and Ablution Facilities

Bathing is one of the outstanding personal habits which suffers in any military operation. Even when facilities are available, such factors as climate and military assignments, and not infrequently military necessity, interfere and deter troops from bathing. Sanitation orders of field commands usually stated that all men would bathe at least once weekly, but bathing by roster was sometimes necessary to overcome the reluctance on the part of many because of the difficulties and the crudeness of facilities provided.

The original construction standards provided by the engineers for camp buildings to be used by American troops directed the omission of bath houses when the water supply was limited, with the intent that water would be heated on Soyer stoves and used in tubs. The extensive construction involved in providing bath

houses was not believed justifiable for the time these facilities would be used. Knowing that the American would neither accept nor adopt this method of taking a bath, the specifications were altered to state that tubs would be located only where an adequate water supply was available, which was a good international compromise. Bathing was abstained from so commonly that surveys by sanitary engineers served to demonstrate that heating of bath houses was a requisite to good health, and authorization of stoves followed.

Troops built improvised shower units as they did with most things. Some units were of sufficient merit to deserve consideration in future planning for field installations. Among the various theaters, troops of the Air Forces, Ordnance, and Engineer units usually fared best in bathing facilities, since they had the advantage of trained mechanics and tools and somehow found the materials with which to extemporize their own bathing facilities where regular provisions did not exist.

The Division of Preventive Medicine directed special attention to the provision of drying rooms for clothing as perhaps the most important feature of clothing and bathing as a health consideration. The original building specifications for camps in the United Kingdom contained no provision for this important part of life in the field, and it was generally given too little consideration by commanding officers of combat units.

Sanitary surveys were most desirably made prior to the arrival of troops assigned to permanent occupation, in order that knowledge of necessary sanitary actions might be in their hands promptly when they arrived. This was not always possible because troop locations may not have been determined. Logistics was always a major problem requiring priorities, and needless to say showering/bathing facilities came close to last. The responsibility for preliminary sanitary surveys was assigned to the preventive Medicine Division of the Office of the Surgeon of the Advance Section. Ordinarily the surveys were made by officer teams, consisting of an epidemiologist and a sanitary engineer. The public water supply was the subject of the most thorough investigation. As in the United States, ownership of the water supply system could be either municipal or private. The sources varied from rivers to shallow wells, and in Northeastern France and Belgium springs and infiltration galleries were most common.

Bathing facilities were surveyed in each town. Although it was not the function of the Medical Department to provide shower and other bathing facilities it was their responsibility to inspect such installations. In some areas shower points operated by the Quartermaster Corps were provided; in others existing public

baths and showers were used, of which some were operated in a sanitary manner and some were not (Gordon, 1945). Conditions were haphazard, to say the least. Bathing facilities for food handlers were often below American standards in overseas areas. For example, in the United Kingdom water often was scarce, and central showers -- if provided in camps -- were at times some distance from the kitchen. This necessitated long walks to and from barracks and kitchens and consequently reduced the frequency of bathing. On some islands in the Pacific, water was not only scarce but was also brackish. A salt water soap was developed to overcome the latter difficulty. Pathogenic organisms were rampant in these types of conditions.

Data obtained from the secret files from the Mediterranean Theater of Operations concerning bathing and laundry provided the following:

(1) General. Bathing and laundry units, while of great value, cannot possibly be provided in sufficient numbers to meet all bath and laundry requirements of troops in the field. This was a definite fend-for-yourself situation.

(2) Bath Units. Bath units are of primary value in forward areas where no other facilities are available to troops. It is impossible and wasteful to attempt to provide this service to rear area troops as well. It was therefore necessary for them to provide their own unit facilities, and this requires improvisation. The provision of simple valves, shower heads, water heating units, etc. which could be utilized in a variety of ways was highly desirable. Simple instructions and simple designs for improvising such facilities were also useful (Army War College, 1943).

Directives and Training

War Department standards and directives for personal hygiene as contained in Army Regulations (AR) 40-205, 31 December 1942, were in effect throughout World War II. Fundamentally they were the same as in AR 40-205, 15 December 1924, merely rewritten and somewhat expanded. As with all aspects of military sanitation, commanding officers were responsible for enforcement of the provisions concerning personal hygiene. The Medical Department was to conduct inspections and recommend appropriate action to correct deficiencies. It was required that each member of the Army be given a course of instruction in hygiene. The paragraph of AR 40-205 devoted specifically to personal cleanliness stated:

"Every member of a command will bathe once daily while in garrison, and in the field at least once weekly. The hands will

be washed before each meal and immediately after visiting a latrine. Teeth will be cleaned with a brush at least once a day. Fingernails will be cut short and kept clean. The hair will be kept short and the beard neatly trimmed. Clothing and bedding will be kept clean. Soiled clothing will be kept in barrack bags. At prescribed physical inspections particular attention will be given to personal cleanliness."

Unit commanders were instructed to determine that the men of their commands had been properly fitted with socks and shoes and that all foot defects were suitably cared for. An undue amount of foot injury and disability from shoes was to be regarded as evidence of inefficiency on the part of responsible officers. Precautions for care of feet during marches were specified. Before long or protracted marches, unit commanders were to inspect the bare feet of their men for defects which might require treatment. While on marches, commanders were to have their men wash their feet each day as soon as practicable after reaching camp, cover blisters or excoriations with a light dressing or zinc oxide plaster, dust the feet with foot powder, and put on clean socks (Preventive Medicine WWII, 1945).

The policies of AR 40-205 were implemented by a continuing program of training and education. Each soldier was issued Basic Field Manual (FM) 21-100, "Soldier's Handbook," which contained a section entitled "Military Sanitation," consisting of instructions for individual compliance with AR 40-205 and simple explanations of the reasons for each rule. The soldier was instructed to report for sick call at the first signs of illness.

A one-hour class in personal hygiene was part of basic training for all soldiers. Training Film 8-155, "Personal Hygiene," was used to demonstrate proper application of rules of cleanliness. Because the material included in this instruction contained little that was new to the soldier, the main purpose of the lesson was to provide motivation for careful observance of the rules and to make clear the relationship of individual health to the health and efficiency of the unit.

Field Manual (FM) 21-10, "Military Sanitation and First Aid," a basic field manual, and FM 8-40, "Field Sanitation," a medical field manual, were used as references for the basic training class and were available at company level throughout the Army. Field Manual 21-10 outlined the general groups of diseases and the sanitary measures for their prevention and control. It included a chapter on personal hygiene and also one on the particular problems of march hygiene. Field Manual 8-40 dealt primarily with environmental sanitation but contained a chapter on factors relative to personal hygiene: care of the feet,

especially for the prevention of dermatomycoses; other skin diseases; scabies; and oral hygiene (Preventive Medicine WWII, 1945).

Personal Hygiene in Overseas Theaters

European Theater of Operations

Standards of personal hygiene varied according both to the facilities available and the type of combat the individual was engaged in. Theater preventive medicine officers at all levels realized the necessity for convincing company officers of the importance of command responsibility for enforcing adequate standards of personal hygiene. Trench foot became such a serious problem that disciplinary action was initiated against the soldier when it was discovered that he had failed to observe any of the prescribed measures.

In the early period of the United Kingdom Base, troop accommodations were overcrowded and bathing facilities were correspondingly inadequate or even absent entirely. Baths and showers were usually installed in separate buildings, often inconveniently far from barracks. A survey late in 1942 brought out the fact that men were not bathing with the frequency that they should because the bathhouses were unheated. Bathing facilities were variable depending on the unit's location, but that a shortage existed in combat units is indicated by numerous requests made by various headquarters and units for additional bath equipment. It was recommended that bath facilities be provided organically with all types of divisions. The 9th Infantry Division reported, for example, that corps shower units with clothes turn-in privileges provided excellent service, but that the disposition of infantry troops prevented removal of more than 2 to 3 percent of any unit from the front at one time; this allowed only 1 bath per man in a 3- to 4-week period.

North African, Mediterranean, and Middle East Theaters of Operations

Experience in both North Africa and Italy seemed to indicate that prior to arrival in the theater individuals had not been well indoctrinated in the importance of food and water sanitation. Homemade baths were set up in Italy by a Quartermaster service company and many units improvised showers. Serious discussion regarding the relationship between desert sores and the lack of bathing facilities led the Preventive Medicine Section, Office of the Surgeon, United States Army Forces Middle East, to recommend an increase in ocean bathing (Army War College, 1944).

Southwest Pacific Area and Indian Subcontinent

The eastern theater of operation during World War II was an area widely prevalent with skin diseases. In the Indian Armed Forces in WWII, the incidence of skin diseases was very high (Raina, 1961). Among British troops skin infections were so common that 30 percent of all cases admitted to the hospitals were related to skin diseases. Impetigo was a major concern, with high outbreaks during very hot weather. In forward areas working facilities were meager at best, and on many occasions it was impossible to avail oneself of even these meager personal sanitation facilities. In 1943 10 percent of the Indian and British troops in the Indian Command were admitted to hospitals because of skin diseases. In U.S. Naval hospitals where men were returning from the South-West Pacific, reports indicated that 20 percent of the patients were admitted due to skin diseases (Reister, 1953).

During 1946 it was noted that a serious outbreak of skin diseases occurred in the British Eastern Command. Proper investigations ensued and it was concluded that the arrival of new draftees from England, who were highly susceptible to skin diseases, accounted for the majority of the problems. Insufficient bathing, improper laundering of clothing and insufficient allotment of clothing were considered the causative factors. When these factors, especially bathing, were rectified the outbreak was brought under control. There was a distinct correlation as to the amount of skin disease in respect to the different social groups. Those with lesser standards of cleanliness had fewer problems, whereas those with higher standards suffered the most. The high temperatures and humidity prevalent in the region prevented the evaporation of sweat from the body, thus rendering the skin sodden and causing it to lose its self-protective natural flora. Malaria was very common among the British, more so than the Indian troops, but the interesting fact was that both suffered from fungus infections and impetigo to the same degree (Army War College, 1944).

There was a strict regard for recognizing the importance of skin disease early in its inception, and as early as 1943 a booklet, "Aids to Treatment of Skin Diseases Commonly Occurring in the Eastern Army Area," was issued to medical officers. Prickly heat which was relatively mild became a serious problem when exacerbated, and frequent bathing was the only form of positive treatment, since there was a severe shortage of drugs for treatment of skin disease (U.S. Army Persian Gulf Command, 1942).

In the Southwest Pacific area the principal efforts were

directed toward unit sanitation. Elimination of the insect vectors of diseases such as malaria and scrub typhus was stressed, with the aim of area control. Individual protective measures, particularly suppression of symptoms by the use of atabrine, were also important. Bathing was not stressed at this time (Army War College, 1948).

Reports from Australia and New Guinea show that frequent physical inspections of troops and informal inspections of all units were carried out to determine the status of training and adherence to standards of all phases of medical, sanitary, and personal hygiene matters. Personal hygiene suffered during early months in the theater because only cold water was provided for showers and in many places bathhouses were dark, cold, and offered little protection from the wind. One division surgeon attributed the occurrence of fungus infections to the inadequate laundry facilities. Personal hygiene was raised to a satisfactory level as hot water systems were installed and construction of bathhouses improved.

Bathing facilities were reported as adequate at most times and ranged from mountain streams, ocean, and lakes to improvised showers. Many units improvised hot water systems for showers. In the Philippines, after an immediate problem of water supply, shower rooms were provided for all troops. Bathing facilities were in the majority of cases improvised, but adequate. In 1943, it was reported that some of the smaller stations in the Assam area had only washracks with drains; however, by 1944 each company and detachment had provided itself with showers. At convoy camps along the Ledo Road soldiers were permitted to sponge off at the rivers, but river bathing was forbidden because of resulting skin infections. In China, each group of Americans constructed their own showers, based upon directions in the Army field manual of sanitation. For a time no heating units were available, but when closed buildings were constructed, hot water was provided for washing and shower facilities (Preventive Medicine WWII, 1945).

DISCUSSION

Historical

An interesting fact surfaced when World War I statistics were evaluated and it was noted that considerable loss of manpower had resulted from skin diseases. It is, however, very surprising that when World War II broke out there was no appreciation of what had taken place previously in order to take appropriate preventive measures. All that data was literally just thrown by

the wayside and forgotten. The problems had to be re-encountered and acknowledged and data collected as if this problem had never occurred before. This reflected very bad judgement and insufficient foresight on the part of those responsible for preventive medicine (Pilinkas and Coben, 1988).

Historically, bathing frequency was acknowledged by all as "bathe as often as possible under the existing circumstances prevailing at the time involved." Normal uncompromised skin from relatively healthy individuals generally encountered either no problems at all or a slight problem with miliaria. The problems ensued when the integrity of the skin was compromised and pathogenic microflora gave rise to more complex infections. Inability to cope with the stress of new and harsh environments increased the blood level of cortisol and ultimately, serious skin disease problems became dominant. In various theaters of war, skin diseases were the single most significant medical cause for loss of full combat effectiveness.

Before skin health became a critical issue the situation was never considered in its entirety nor placed in its proper perspective. Sick call was handled symptomatically on case-by-case basis with disposition depending on the severity of the situation, i.e., from outpatient treatment to several days hospitalization and, in extreme cases, evacuation. Medical personnel did not address the problem epidemiologically and in most cases did not have the time or personnel to do the job correctly.

In due time combat commanders became highly distraught at their inability to maintain their unit strength. Short and precise epidemiological studies showed the problem involving personnel losses to be the result of skin diseases. When enough field commanders complained (and this was not done with determination until the Vietnam War), then and only then was the situation taken as a serious threat to the unit's combat effectiveness.

Personal Hygiene Practices

The relative role of personal hygiene in control of disease has varied considerably according to the degree of unit sanitation and area control achieved and according to the degree of specific protection afforded by measures such as immunization. There are few outbreaks of disease in which only one factor can be implicated; it is therefore difficult in most cases to correlate specifically good or bad personal hygiene with disease incidence. A continuing educational program, combined with frequent inspection by both commanders and medical personnel, has

been found necessary to keep individual health observance at proper levels. Commanders in the field hold the ultimate responsibility for the decrease in combat effectiveness due to skin disease.

Bathing should, indeed, be performed as often as possible under the existing situations (Greene, 1984). If showers are not available vulnerable parts of the body should be washed with a washcloth daily, which would take minimal quantities of water. Following these minimal preventive procedures, foot powders (talcum powders) should be readily available to prevent initial problems or to prevent exacerbation of relatively minor problems (Quartermaster Corp, 1945).

Few preventive medicine officers have been able to provide for necessary bathing in the field; therefore, small abrasions became serious problems in short order without adequate hygiene (Army War College, 1948). Hospitalization was then required and combat effectiveness was decreased. Cleaning of the body with soap and water followed by mild antiseptic solutions often sufficed in most cases. However, frequent bathing after release from the hospital was again hard to achieve (Quartermaster Corp, 1945). Prophylactic treatment with vitamin C was tried; however, various units showed no correlation between the utilization of vitamin C and the incidence of skin disease, nor did vitamin C increase the rate of healing once the skin disease was pronounced (U.S. Army Medical Department, 1945).

It has been noted that the officers who had a higher standard of personal cleanliness generally escaped the high incidence of skin disease. They somehow managed to bathe more frequently with adequate water. Another important observation noted was the relatively rare incidence of skin disease in the troops permanently stationed in camp areas with ample facilities for washing and bathing. Where water was scarce the incidence of skin diseases was up considerably. It was noted by one medical doctor that sweat acted as the main irritant and prevented the healing of even minor skin diseases. When the sweated area was not cleansed frequently the severity of irritation increased and the area became ulcerated, whereupon hospitalization and even evacuation eventually ensued.

The bacterial flora in hot climates was found to be so varied that no single type of organism could be incriminated in certain disease syndromes. It did seem, however, that the vast majority of pathogens isolated from the Middle East Area were haemolytic streptococci. In early stages of disease merely washing, application of weak antiseptics and keeping the area clean was successful in the majority of cases. Neglect could result in

infection requiring extended hospitalization.

If skin disease is caught at an early stage adequate control and prophylactic measures against serious pathogenic organism infiltration can be accomplished and loss of combat effectiveness will be minimal. If the problem evolves into the second stage then the combat ineffectiveness statistics will increase dramatically. The unit commander will have to adopt a "get tough" attitude; the responsibility will ultimately be his if the field soldier does not comply with adequate preventive hygienic measures. If combat situations are such that adequate bathing and prophylactic measures cannot be adhered to then alternative actions (which will be second best at most) will have to be devised by the commander and the preventive medicine teams to minimize the impact on combat effectiveness.

The overall recommendation for prevention of skin diseases was the wearing of loose clothing and daily bathing. This was the best prophylactic measure against skin disease complications (Taylor, 1975). We must understand, however, that attention to the issue of shower frequency is long overdue, setting aside the morale factor (OTSG, 1990).

Shower/Bath Water Quality

A problem of the Medical Department is to convince line officers of their responsibility in enforcing health precautions, such as water discipline (Bellamy, 1990). One of the dangers has been schistosomiasis. Newspaper items, posters, roadside signs, and demonstration vans all warned of the dangers of bathing or swimming in fresh water streams and ponds. The educational program was the main weapon against this disease, and as troops recognized the severity of the illness and understood its mode of transmission, the incidence of schistosomiasis decreased. Experienced observers agree that there were numerous lapses from established minimum standards and that, in future military operations, thorough training in personal hygiene will be necessary. This training must include not only the principles and methods to be applied, but should also serve to motivate personnel of all ranks. In addition, there must be command and medical inspections coupled with provisions for effective corrective actions (Dept. Of Advanced Preventive Medicine Studies, 1990).

It is essential to treat all oases and rural sources of water, making mandatory treatment before bathing a prerequisite. In the Persian Gulf countries we must assume that the indigenous urban water supplies are never adequately treated. The basic rule must be followed, i.e., "Untreated water is contaminated water"

(Barrett, 1982). This is a concept that must be instilled into all field personnel. It has been stated by several authors that even bathing in polluted waters is better than not bathing at all (Allen, 1987). I vehemently disagree with this concept due to the serious consequences that can potentially ensue. (Bedouin concept to be discussed later.) All swimming or bathing in bodies of slow moving or standing fresh water (pools, ponds, canals, oases) should be strictly avoided unless the water has been well treated with hypochlorite, iodine derivatives or other products of equal antibacterial quality. The bacterial, viral, fungal, and parasitic diseases are easily transmitted by this route. It is the responsibility of the command surgeon to determine whether it is necessary to disinfect nonpotable water for showers (TB MED 577).

Additional Considerations

Antimicrobial Soaps

Historical data as it pertains to the efficacy of antimicrobial soaps is practically nonexistent. In the numerous military theaters of operation, ordinary soaps were considered adequate to be used in bathing to remove all types of filth, including byproducts of normal metabolism, pathogenic and nonpathogenic organisms, from the surface of the skin. This procedure was considered adequate since the gram-positive organisms responsible for strong body odors were ultimately removed by this normal bathing procedure.

The efficacy of antimicrobial soaps is questionable at this time and raises an issue that will require further intensive study. Some of the effective antimicrobials have been banned due to toxicity problems, while others have been acknowledged to decrease pathogenic and nonpathogenic organisms from the skin, but it cannot be stated for certain if skin diseases can be prevented by the inclusion of antimicrobial soaps into a regular cleaning regimen. If the integrity of the skin has been compromised then specific antimicrobial soaps can eliminate or deter the growth of pathogenic organisms in the injured or compromised area to the benefit of the patient; however, ordinary soap with frequent bathing can also produce the same results. Prophylactic effects appear to be the prime significance of the antimicrobial action, and this is questionable.

It should also be acknowledged that antimicrobial soaps can irritate and ultimately exacerbate a relatively minor skin problem, whereby systemic antibiotics will be necessary to combat the secondary infection which ultimately occurs. More than one skin disease case has been reported in the Military Medical

Bulletin where various skin diseases which were relatively minor initially have erupted due to the harsh chemical nature of the antimicrobial active components. The main current concept of skin disease control is early diagnosis and treatment with adequate prophylactic measures.

Prevention of Louse-Borne Diseases

a. General. The body louse is the only species which transmits diseases. Control measures discussed here will be directed primarily toward that species. Additional information on the control of head and crab lice is available through preventive medicine services and from entomologists (FM 8-250, 9-31, 9-32, 15-11).

b. Individual Protective Measures. Individual containers of insecticide powder for louse control must be stocked by each unit supply section, but are issued only when directed by medical personnel. Directions for individual application are printed on each container. It is important to note that body louse control must include treatment of the clothing, where the lice live. Laundering clothing at 140°F for 20 minutes or standard dry cleaning procedures will also kill all stages of body lice. Frequent bathing and changing of clothing (including undergarments) can help prevent infestations or ensure their early detection.

Morale

The morale issue is certainly significant, since as previously stated our society has rather fixed mores concerning frequent bathing functions. This issue is an individual problem since it obviously bothers some more than others. I have read of soldiers returning from the Persian Gulf stating they have not showered in 6 weeks. No physical harm was done, but they found it to be psychologically punishing. After action reports on this issue should be very interesting since practically everyone I consulted with that returned from the Gulf could not wait to get to that shower.

SUMMARY AND CONCLUSIONS

1. If the circumstances are such that favorable conditions prevail, then showers/bathing should be performed daily.
2. If the circumstances are not adequate, then at least weekly

shower/bathing should be adhered to. Clothing should also be cleansed as frequently as possible.

3. If hygienic conditions worsen, then the "wet cloth" wash down of crucial body areas should be included with the wearing of loose fitting clothing.

4. It is necessary to try in the best manner possible to keep susceptible areas of the body dry.

5. Prevent the skin from becoming compromised or injured where possible.

6. Do not allow troops to wash in filthy water. The consequences may be more drastic than no cleansing at all .

7. Obtain and use talc powders in crucial body areas susceptible to chaffing.

8. Loose clothing is essential and, if possible, a mild antiseptic should be utilized when the clothing is washed. Mild is the key word here: potent antiseptics could initiate skin irritations.

9. If the skin integrity is compromised in any way, obtain treatment immediately. A minor problem can become major in very short order.

10. If in a position where no treatment can be obtained, then keep the areas of the skin of concern as dry as possible. Only wash with approved source water or not at all. If only small amounts are available then "wet cloth" the area and air dry.

11. If the above cannot be adhered to and secondary infections ensue, then medical help must be sought or else in short order personnel will be out of action completely. Antibiotics, anti-fungal agents, etc. must then be utilized along with adequate skin cleansing.

12. Antimicrobial soaps are mediocre at best for healthy skin but could be beneficial for skin with loss of integrity in order to prevent infection.

13. No vitamin, including vitamin C, has been shown to have positive effects once a problem occurs. This treatment has been tried.

14. Keep in mind that Bedouin nomads do not wash at all except for few drops in their hands and face before their daily prayers.

The loose clothing fit plus the strong hereditary protective factors for skin disease resistance play an important role in keeping them healthy. The body odor, however, is another story.

FINAL COMMENT

The effect of shower/bath frequency on the health and operational effectiveness of the field soldier is a subject demanding more study. In January of 1990, in a significant memorandum specific to this issue, the Office of the Surgeon General had stated, "We believe that the issue of shower frequency is long overdue for medical evaluation notwithstanding the morale factor." I agree with this statement wholeheartedly. As an IMA of long standing, I had commenced this project many years prior, however I was advised by the higher command at that time to discontinue the project. I had no idea who or what was involved in that decision, since as an IMA I have only a short period of time to complete a project; therefore I was unable to involve myself with that part of the issue. With the initiation of the project now in effect I am pleased to be a part of the effort. I certainly hope that the data gleaned and put together in a relatively brief time span will be significant to all concerned.

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APPENDIX: GLOSSARY OF TERMS

FST	Field sanitation team
IMA	Individual Mobilization Augmentee
MS	Medical Services
NASA	National Aeronautics and Space Administration
OSS	Office of Strategic Services
OTSG	Office of the Surgeon General
USABRDL	U.S. Army Biomedical Research & Development Laboratory
USAR	U.S. Army Reserves
WWII	World War II

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