Armed Forces Pest Management Board
Technical Guide No. 6

Delousing Procedures for Contingency Operations

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FOREWORD

This is one of a series of Technical Guides (TGs) published by the the Strategy and Information Division (SID), Armed Forces Pest Management Board (AFPMB). The AFPMB is a directorate within the Office of the Assistant Secretary of Defense for Energy, Installations and Environment that recommends policies and procedures, provides guidance, and coordinates the exchange of information related to pest management throughout the Department of Defense (DoD). As a unit of the AFPMB, SID collects, stores and disseminates published and unpublished information on arthropod vectors and pests, natural resources, and environmental biology important to the DoD. Other SID products include country- or region-specific Disease Vector Ecology Profiles (DVEPs). All TGs and DVEPs, are available at the AFPMB Web site: <http://www.acq.osd.mil/eie/afpmb>.

TGs (formerly Technical Information Memoranda or TIMs) are not policy documents; rather, they provide technical guidance for the use of the DoD pest management community and others. Accordingly, TGs should not be construed or referenced as policy. DoD pest management policies may be found in DoD Instruction 4715.1, “Environmental Safety and Occupational Health (ESOH),” DoD Instruction 4150.07, “DoD Pest Management Program,” other DoD directives and instructions, and implementing component directives/instructions/regulations.

Inquiries, comments or suggestions for improving TGs may be directed to the Chief, ISD, at (301) 295-7476, FAX (301) 295-7473.

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This Technical Guide was authored by Stephen B. Berté, COL USA (retired), formerly of the AFPMB, and reviewed by the AFPMB Medical Entomology Committee. The most recent revision was completed by Mr. Joshua Bast, Defense Centers for Public Health - Aberdeen, in 2024. Special thanks to Dr. Will Reeves, USDA and CPT Paul Lenhart, USA/Public Health Command, West for their thorough review of the manuscript.

1. PURPOSE

The purpose of this technical guide is to provide guidance on safe, effective and efficient procedures for controlling outbreaks of louse-borne disease transmitted by the human body louse, *Pediculus humanus humanus*, such as epidemic louse-borne typhus (*Rickettsia prowazekii*), epidemic relapsing fever (*Borrelia recurrentis*), and trench fever (*Bartonella quintana*), in detainee and other Dislocated Civilian (DC) operations under control of the Department of Defense (DoD). Louse-borne disease control in the absence of mass delousing with power equipment or the topical application of pesticide dusts must be accomplished through the joint efforts of a variety of DoD non-medical and medical assets to control both body lice and the pathogens they transmit.

2. REFERENCES

See Appendix A for references.

3. BACKGROUND

Louse-borne disease outbreaks pose a major threat to militaries engaged in large scale combat operations (LSCO) and can have devastating effects on DC populations. Without a concerted delousing program and treatment of infected individuals these outbreaks can result in significant morbidity and mortality among affected populations.

Sucking lice (Psocodea: Phthiraptera: Anoplura) are obligate blood-feeding ectoparasites that spend their entire lifecycle on mammalian hosts (1) (2). Most species are highly host specific, including all species associated with humans (2). Humans can host two species of lice: *Pediculus humanus*, the human louse, and the pubic louse *Pthirus pubis*. The human louse was traditionally split into two subspecies: *Pe. humanus humanus* the human body louse, and *Pe. humanus capitis* the human head louse (2). However, current research has demonstrated that these two forms are distinct ecotypes that arise multiple times within different mitochondrial clades of *Pe. humanus* (3). It may be possible for massive head lice infestations of certain clades to transition to the body louse ecotype. Body lice are the major vector of three human pathogenic bacteria and their associated diseases: *Rickettsia prowazekii* (epidemic typhus), *Borrelia recurrentis* (louse-borne relapsing fever), and *Bartonella quintana* (trench fever) (3). Body lice are unique among sucking lice in that eggs (nits) are deposited in the seams of clothing as opposed to glued to hair shafts on the body. There are several other morphological and behavioral traits that are adaptive for body lice and increase their vector potential (4). Eggs emerge after 5-7 days depending on the temperature and body lice proceed through three nymphal instars to reach maturity in 16-18 days (2).

Body lice are spread from person to person through close bodily contact or sharing of clothing and blankets (2) (4). Body lice infestations have overlapping generations and are present in all seasons. As opposed to other insect vectors, body lice often pose the biggest threat in winter when humans spend more time in close quarters. Body lice and

louse-borne disease outbreaks occur sporadically worldwide in areas where U.S. Forces operate. Body lice infestations are maintained in human populations unable to conduct routine hygiene of their body and clothing. A small portion of untreated louse-borne typhus can persist as a latent infection and reemerge as Brill-Zinsser disease, making humans the primary reservoir for the bacteria (5). During peacetime, this is generally limited to homeless or transient populations. Social disruptions and population crowding due to natural disasters or political/military conflicts can result in the spread of body louse infestations among detainees and DCs and lead to disease epidemics. With regard to military conflicts, Article 29 of the third Geneva Convention of 1949 states that detaining powers shall take all sanitary measures necessary to prevent epidemics (6) The DoD no longer possesses mass delousing capability using power delousers dispensing topically applied pesticides. However, treatment of disease cases with antibiotics in conjunction with the delousing procedures covered in this guide have been shown to be effective (Appendix C).

U.S. Armed Forces may be involved in missions either dealing with detention operations or DC operations. The US Agency for International Development (USAID) Bureau for Humanitarian Assistance (BHA) is the lead federal coordinator for international disaster assistance and may request DoD support for tasks such as camp construction, provision of care or transportation (7) Joint Publication (JP) 3-63, Detainee Operations, provides guidelines for planning and conducting detainee operations. The responsibilities of DoD medical personnel in detainee operations are outlined in DoDI 2310.08, Medical Program Support for Detainee Operations. In addition to operating camps for detainees, the U.S. military may be tasked with operating camps for civilians dislocated by military actions or natural disasters during stability operations when the host nation (HN) is not able to perform such duties. These responsibilities are detailed in Joint Pub 3-07, Stability, JP 3-29, Foreign Humanitarian Assistance, and JP- 4-02, Joint Health Services. Quartermaster units can provide field laundry and bath units to support such detainee and DC operations. Military law enforcement personnel, quartermaster, and medical units tasked with supporting detainee or DC operations no longer have the capability to conduct conventional mass delousing operations, and no clear guidance on louse control is currently available for their use. This document is intended to fill that guidance gap.

Louse infestations during WWI were common and concern about louse-borne disease was so great that, after the armistice in 1918, returning troops were deloused at ports of debarkation, where they were quarantined for 14 days. At the beginning of WWII, louse control procedures had not progressed far beyond such techniques as dusting with NCI powder (96 percent naphthalene, 2 percent creosote, 2 percent iodoform) and smearing “vermijelli” (crude mineral oil, soft soap, and water, mixed 9:5:1) along the seams of clothing, a practice retained from WWI. In WWII, the delousing powder of choice was MYL, a mixture of substances with pyrethrins as the primary active ingredient, which was gradually replaced by DDT in 1943. The military’s first multi-nozzle, gasoline engine-driven power delousing equipment was also developed and deployed at this time (8).

Mass delousing machines were used during the Korean conflict. The failure of DDT to control body lice on prisoners of war and Korean refugees in early 1951 stemmed from louse resistance to this insecticide. Due in part to the development of resistance by body lice to DDT on a global scale, the DoD dropped DDT dust from the military supply system in 1965. It was replaced with lindane, which effectively controlled DDT-resistant lice and was included in the military supply system for that purpose. However, as early as the mid-1950s, reports of lindane resistance in body lice had begun to appear in various parts of the world (8). Lindane dust, which was a U.S. Environmental Protection Agency (EPA) registered product, was the U.S. Armed Forces standard delousing material until the 1990s.

In the early 1990s, the U.S. Army Medical Research and Materiel Command (USAMRMC) (now the US Army Medical Research and Development Command) began looking for replacement delousing powders in an attempt to find safer and more effective alternatives to lindane dust. The DoD was advised by the Food and Drug Administration (FDA) on February 23, 1993 that any newly developed dusting powder or material intended to be applied directly on humans for the control of body lice would be considered a drug subject to regulation by the Federal Food, Drug and Cosmetic Act (9). The FDA regards new preparations offered for use as human pediculicides to be new drugs requiring an approved New Drug Application. The USAMRMC then asked commercial pesticide manufacturers to develop a product that could be licensed by the FDA for use in power delousing machines. No pesticide manufacturing company agreed to develop such an item, citing lack of a sufficient market in which to sell a product that would have to undergo an expensive developmental effort. On March 25, 1994, the AFPMB recommended that lindane powder be removed from the military supply system due to safety concerns over use of this product, which had been identified as a carcinogen. As no chemicals were either available or being developed for use in delousing machines, the AFPMB requested cancellation of the national stock number for power delousing equipment on May 29, 1997.

Although chemical dusts containing lindane, permethrin, and other chemicals are still used in other countries to control body lice, the DoD bases its treatment recommendations on products that can be used in the U.S. Even if a topical pesticide dust could be administered to infested personnel, the application of such chemicals to the skin of personnel who are very likely to have cuts, abrasions, or open lesions is ill advised. Currently, DoD relies on permethrin to treat uniforms to repel and control body lice on soldiers, detainees, and DCs. Permethrin-treated clothing has been shown to offer protection against body louse infestations, even after over 20 wash cycles (10). Testing of permethrin-treated uniforms with other biting insects (e.g., mosquitoes) has shown that the fabric continues to protect from bites through 50 wash cycles.

The DoD currently has four permethrin formulations registered with the EPA for applications to uniforms. Additionally, factory treatment of a variety of uniforms has been approved (Appendix D). However, no pesticides are registered with the U.S. Environmental Protection Agency for use in mass delousing. Therefore, the DoD cannot

use pesticides in mass delousing to effectively treat louse-infested detainees or DCs.

Although U.S. Forces possess the capability to protect themselves from disease through the use of insecticide-treated uniforms, louse infestations and louse-borne disease may be a threat in other populations for which the DoD must care (Appendix B). The DoD has responsibility for the health and welfare of detainees and, during Foreign Humanitarian Assistance (FHA) Missions, may be responsible for DCs until governmental or international organizations such as the International Committee of the Red Cross (ICRC) can take over their care. Use of permethrin-treated uniforms or treatment of civilian clothing with permethrin may not be practical in these situations. Although international health organizations still propose mass delousing with pesticide powders to control epidemic louse-borne disease (Appendix C), the DoD no longer has that capability, so there is a need for an alternative treatment protocol. Additionally, although mass delousing of foreign nationals may be acceptable when conducted by the host nation or an international organization, these intrusive procedures would likely not be tolerated when conducted by military personnel.

Currently, the best alternative available to U.S. Forces for controlling louse-borne disease in populations such as detainees and DCs involves therapeutic treatment of louse-borne disease in conjunction with control of lice through bathing infested personnel while cleaning their clothes using laundering regimens lethal to lice and their eggs. The ICRC used this approach successfully in 1991 in Ethiopia subsequent to the civil war in that country (11). That control effort demonstrated that case treatment with antibiotics alone was insufficient to stop the spread of louse-borne relapsing fever. Only when delousing was also done was disease controlled. Camp staff accomplished delousing by ensuring that detainees bathed and boiling their clothes. Using these techniques, the number of soldiers deloused per day ranged from 490 to 1215 in a camp containing 18,628 soldiers awaiting repatriation. The Standard Operating Procedures (SOP) for in-processing detainees in Afghanistan and Iraq between 2003 and 2011 included making detainees wear coveralls and providing routine medical care. This SOP was adequate to negate concerns about louse-borne disease. Similar SOPs would be adequate, unless the numbers of persons that had to be in-processed were large enough to overwhelm the system.

Another potentially effective tool to control body louse infestations associated with social disruptions is the use of oral or topical ivermectin. Foucault et al. (12) demonstrated that oral ivermectin is effective in controlling body louse infestations and CDC recommends the off label use of topical ivermectin in certain circumstances (https://www.cdc.gov/parasites/lice/body/treatment.html). Ivermectin is used commonly in the developing world to treat parasites. It is used in veterinary medicine to eliminate fleas and ticks. By administering 3 doses of 12mg each at 7-day intervals, Foucault et al. showed that the number of lice in a cohort of 33 homeless individuals fell dramatically from 1898 to just 15 in 14 days. Combined with current delousing techniques, therapeutic treatment with ivermectin could prove to be a useful and practical approach to control of louse-borne typhus outbreaks. It must be stressed that

the use of oral or topical pediculicides would require a physician to make off-label prescriptions, which can only be done as part of direct care. The primary method of delousing recommended by this technical guide employs laundering. The remainder of this document provides guidance on laundering regimens which, when combined with bathing of lousy individuals, will result in delousing detainee populations.

4. LAUNDERING AND TEMPERATURES LETHAL TO LICE

Studies (13) (14) (15) (16) show that washing lousy clothes for at least 15 minutes at 54°C (130°F) or hotter is sufficient to kill all life stages on them. As washed clothes must be dried, drying clothing items in a tumble drier that circulates air through the clothes at 60°C (140°F) or hotter for about 15 minutes provides additional assurance that all lice and their nits will be killed. These temperatures are easily achieved in the home as well as industrial laundering cycles intended for most fabrics. Increasing temperatures above those cited would further ensure that all life stages of lice are killed and allow for shorter exposures to hot air or water. For example, wash time could be decreased to 10 minutes at 60°C (140°F), or 5 minutes at 70°C (158°F). Drying time could be decreased to 10 minutes at 70°C (158°F), or 5 minutes at 77°C (170°F). All these time recommendations assume that efficient circulation of air/water occurs to ensure all parts of the infested cloth are exposed to the proper temperature for the appropriate time.

Woolen items present a challenge because not all of them can be laundered in water, and those that can, must be washed in water that usually should not exceed 32°C (90°F), which is below the lethal temperature for lice and their nits. However, many fabrics, including woolens, can be dry cleaned, which kills all louse life stages (13) (17). Additionally, the CDC recommends items that cannot be washed can be placed in a plastic bag and stored for two weeks.

Body lice are quite tolerant of cold temperatures and immersion. Busvine (14) reported that exposure of louse eggs to temperatures of -20°C (-4°F) for 5 hours was needed to kill them all. A study on lice mortality after immersion in water was conducted by Mumcuoglu et. al. (18) and showed that all lice died after immersion in 10 ml of tap water within 19 hours. Although both freezing and submersion are options to consider given the operational conditions, both are impractical given the long durations needed to kill all life stages.

Current U.S. military (e.g., U.S. Army) field laundry systems can achieve maximum washing temperatures of about 71°C (160°F) and drying temperatures in excess of 71°C (160°F) (19). The Army’s truck-mounted Laundry Advanced System (LADS) has an allowable wash temperature range of 21 - 71°C (70-160°F) and defaults of 65.5°C (150°F) wash water temperature and 71°C (160°F) drying temperature. A typical cycle lasts 65-75 minutes inclusive of both washing and drying. Therefore, a typical LADS cycle running on default should be sufficient in killing all lice and nits (20). Military uniforms treated with insecticide provide an added level of protection and should not support infestation by body lice. The cleaning cycles intended for military woolen items

achieve only marginally lethal temperatures (49°C (120°F)) and this only in the drying cycle, which can be quite short for such items. Thus, military field laundry systems have the washing cycles able to achieve temperatures sufficient to kill lice and nits on civilian clothing items excluding those made of wool.

5. PREVENTION AND CONTROL

5-1. Primary and Secondary Prevention of Louse-borne Disease

An effective control program for louse-borne disease should start with both primary and secondary preventive measures. Primary measures serve to reduce the chance that cases of louse- borne disease will occur, whereas secondary prevention focuses on treating the disease when it does occur. Medical personnel need to provide oversight and participate as required to ensure that an effective louse-borne disease prevention program is executed. Individual delousing can be accomplished with initial isolation and screening followed by laundering and bathing procedures and should be augmented with permethrin treatment of clothing whenever possible. These procedures are based in part on a strategy that first proved successful in Naples in 1943, prior to the use of mass delousing operations (Appendix C), and consists of the following steps:

Primary Prevention

-Initial screening
-Case finding
-Isolation
-Contact delousing

Secondary Prevention

-Treatment of patients with louse-borne disease

(1) Initial screening. DoD doctrine / instruction (21) (22) (23) on the operation of detention facilities direct that a medical officer examine each new detainee upon arrival at a facility and monthly thereafter. Detainees are not to be admitted into the general population until their medical fitness is determined, in part through examinations to assess the state of health, nutrition, and cleanliness of each detainee and to detect vermin infestation and communicable diseases. Part of the medical processing that is normally accomplished after arrival includes a physical inspection, during which time the presence of head and body lice can be determined. Personnel infested with body and head lice should be segregated from those who are not until delousing can be accomplished. Segregation should not separate family units in the case of DC operations. See “Delousing Procedures” below for details.

(2) Case finding. Determination of the presence of body lice during the screening phase should trigger close monitoring of the at-risk population by the medical staff to identify cases of louse-borne disease as soon as possible. Identification of cases of louse-borne disease must be based on case definitions established by the medical staff

guided the Armed Forces Reportable Medical Events Guidelines and Case Definitions. Delousing of infested personnel should proceed as soon as possible, but in the absence of louse-borne disease, the infestation should be viewed as a sanitation issue, not a medical emergency issue.

(3) Isolation. DoD instruction on the operation of detention facilities direct that all detainees suspected of having communicable diseases must be isolated from the general population for examination by a medical officer (22). However, if louse-borne disease is confirmed, isolation of patients from other people is *only* required until the patients, and anyone they may encounter, are deloused. The diseases of concern (louse-borne typhus, epidemic relapsing fever, trench fever) are transmitted by lice only, so once a patient is deloused, there is no need to keep them isolated from other, uninfested people. Thus, if the logistical system is temporarily overloaded, and camp inhabitants cannot all be deloused, then deloused patients must only be isolated from infested individuals to prevent their re-infestation and possible transmission of a disease. Deloused and louse-infested personnel should not be allow to mix, irrespective of whether or not they have a louse-borne disease, because re-infestation of personnel would result in further loading of the logistical system. When isolation must be accomplished during DC support operations, family units should not be separated.

(4) Contact delousing. Immediate contacts of patients should be given priority for delousing and isolated following the same guidelines for isolation of patients discussed above. See “Delousing Procedures” below for details. If head lice are present, they should be treated following standard medical protocols for that pest. Medical personnel should observe contacts for the maximum incubation periods of the louse-borne disease they are suspected of having. These are 14 days for louse-borne typhus, 15 days for relapsing fever, and 30 days for trench fever (24).

(5) Treatment of patients with louse-borne disease. Patients identified using the case definition developed by the senior medical officer or surgeon should be deloused and then treated for the particular louse-borne disease present with an appropriate therapeutic regimen. Although pediculicide shampoos are available for treating head lice (which live on head hair), they have little effect against body lice (which live on the victim’s clothing). If head lice are present, they should be treated following appropriate medical protocols for treatment of those pests. Body louse eggs or nits, which are deposited in the seams of clothing, are unaffected by shampooing the hair or bathing the body, so delousing must include treatment of clothing.

5-2. Delousing Procedures

Control of body louse infestations is the first step in preventing outbreaks of louse-borne disease. Body louse control should be accomplished by removing patients’ clothing and laundering it and any bedding they may possess. As a protective measure, anyone handling louse-infested clothing or materials should, at a minimum, use the DoD Insect Repellent System (Appendix E) and wear surgical gloves. Laundry personnel should

also wear protective gloves, surgical masks, and possibly rubber waterproof aprons when handling infested items (11). Infested clothing should not be stored on or near un-infested cloth materials or handled by unprotected personnel.

Once they are deloused, no extraordinary measures are needed to delouse patients' bodies other than a normal shower and shampoo because body lice live and lay eggs on the clothes, not the body. If head lice are present, standard protocols for their control should be enacted. Whenever possible, cleaned clothing should be impregnated with permethrin using methods currently available in the DoD supply system (Appendix D) to prevent re-infestation by lice.

Washing clothing in cycles that provide water at a minimum time and temperature of 15 minutes and 54°C (130°F) is adequate to kill all lice and nits on clothing materials. Ensure that washing machines are not overloaded so that agitation is sufficient to thoroughly wet all layers of the clothing materials in the load with hot water for the minimum time and that insulating bubbles are dispelled from the fabrics. If the efficiency of agitation or wetting of clothing by the machine is suspected of being sub-optimal, hotter temperature water and/or longer exposure times should be used to ensure louse and nit mortality. Woolen items often cannot be laundered in water, and those that must be washed at temperatures that are not lethal to lice or their nits. However, woolens can often be dry cleaned, which kills all louse life stages.

If laundry facilities are not available or are overwhelmed with the volume of clothing to be deloused, manual methods may be used. For example, manually soaking clothing materials in field-expedient hot water baths will also result in delousing of the items immersed. However, care must be taken that water temperatures are maintained at 54°C (130°F) or higher for at least 15 minutes and that manual agitation is done to ensure that all cloth surfaces are rapidly saturated and that insulating air bubbles are dispelled from the fabric.

Drying clothing items in a tumble drier that circulates air through the clothes at 60°C (140°F) or hotter for 15 minutes will also kill all louse life stages and so provides additional assurance that all lice and their nits are killed. If mechanical driers are \unavailable, washed clothes may be air dried provided that lethal times and temperatures were achieved in the washing cycle.

A field-expedient method of using air temperature to kill lice may be available in hot, sunny environments. This could involve such approaches as hanging infested clothes in a "hot house" structure, such as a metal shack, where internal temperatures reach or exceed 70°C (158°F) or higher for at least one hour. Because there is essentially no air circulation in such structures, an extended time is needed to ensure lethal temperatures are achieved at the center of all clothing items.

The bottom line on field-expedient methods is that so long as the minimum lethal time and temperature regimens are reached throughout all portions of the infested clothing, a

wide variety of innovative methods could be used.

Unfed body lice can reportedly live for no more than 10 days off the human body. This length of time is due in part to environmental temperatures off the human body that may lead to death. However, lice at the center of a mass of clothing may, under the correct conditions, survive for nearly a month. Therefore, the method of setting clothing aside to wait until all lice and nits die is impractical. Further, as the sanitation standards of detainee facilities and DC camps must be maintained at high level, this method of louse control is not a good option.

6. SUMMARY

Control of louse-borne disease depends on a coordinated effort among operational, logistical and medical organizations to identify body louse infestations in detainee and DC populations under DoD control. The DoD can no longer control body lice by dusting infested personnel with pesticides. Field laundry units or contractors can dry clean, or wash and dry clothing at times and temperatures lethal to lice and their eggs, which is the method of control to be used for delousing clothing items. Clinicians and public health personnel will determine louse-borne disease surveillance techniques, case definitions and therapeutic regimens for the treatment of patients.

The DoD will almost always be in a supporting role in large-scale FHA operations. Early planning is necessary to ensure unity of effort between the DoD, U.S. Dept. of State, USAID, the host nation, international organizations and other non-governmental organizations to accomplish the mission. Contracting laundry and bath support from civilian sources will have to be an option included in the contingency plans for any such operations.

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APPENDIX B. DOD RESPONSIBILITY DETAINEES AND DISPLACED PERSONS

The DoD responsibility for caring for the health and welfare of detainees and DCs is documented in a number of DoD publications, some of which are annotated below.

Joint Pub 3-07, *Stability*, 03 August 2016. Chapter III Section B Paragraph 10.h (Public Health) states that the Joint Force Commander (JFC) may employ forces to conduct medical FHA to support local military and civilian health systems or provide direct public health care to include primary medical, dental, veterinary, and other needed care. Medical civil-military operations (CMO) must always be coordinated closely with USAID/BHA health advisors, other USG departments and agencies, HN medical authorities, NGOs, and international organizations. Primary consideration must be given to supporting and supplementing existing medical infrastructure. The JFC must avoid operations that supplant existing public health and medical infrastructure or subvert longer-term plans.

Joint Pub 4-02, *Joint Health Services*, 28 September 2018.
The Executive Summary for Detainee Operations states that the medical program support for detainee operations shall comply with the principles, spirit, and intent of the law of war and the Geneva Conventions. To the extent practicable, treatment of detainees should be guided by professional judgments and standards similar to those that would be applied to personnel of the Armed Forces of the United States.

Chapter IV paragraph 3.b.(47), states that the Joint Force Surgeon (JFS), in conjunction with the Joint Force Staff Judge Advocate (SJA) and Combatant Command (CCMD) Surgeon, develop joint force policies and procedures for detainee medical care. Chapter IV, paragraph 3.b.(25) states that the JFS is to keep the JFC appraised all other medical support activities in the JOA that may play a role in the mission to ensure unity of effort. These may include NGOs, international organizations, multinational medical units, HN medical assets, and other USG departments and agencies and activities/interest in the public health sector.

Chapter IV paragraph 3.b.(31) states that The JFS coordinates FHA augmentation and provide medical support to the resultant CMO. In addition, other special operations units may need conventional force medical augmentation in austere environments.

DOD Instruction 2310.08, *Medical Program Support for Detainee Operations*, 5 September 2019.
Paragraph 3-6 relates to exceptions to consent for medical treatment or intervention. It states that upon the recommendation of the senior medical officer of a detention facility, a detention facility commander may: (1) Order mandatory testing or screening for tuberculosis or other infectious disease deemed to present a public health threat to the detainee population or staff. (2) To the extent necessary to prevent the spread of an infectious disease, order infection control measures (e.g., medical isolation or quarantine, ongoing medical surveillance, or involuntary treatment, such as

immunization or chemoprophylaxis) for a detainee with, or exposed to, an infectious disease of public health concern.

APPENDIX C. REVIEW OF METHODS OF CONTROLLING BODY LOUSE INFESTATIONS

The following are some methods that have been used or are currently recommended for use in controlling epidemics of louse-borne disease by various health organizations.

U.S. Army, 1943: An effective protocol for controlling epidemic typhus was used as early as 1943 in combating the typhus outbreak in Naples, Italy (1). Its most important components included:

-case finding
-isolation
-removal of patients to hospitals
-contact delousing

Although mass delousing was credited with averting outbreaks of typhus in other populations in Europe in 1944-45, it is important to note that the four steps listed above, rather than mass delousing, were deemed responsible for stopping the 1943 Naples epidemic (2).

World Health Organization, 1997 (3):

-Exposure of infested clothing to heat to kill lice and nits, or
-Individual or mass delousing of people using pesticide dusts
-Impregnation of clothing with a pesticide such as permethrin
-Observation of louse-infested persons exposed to typhus fever for 15 days after application of an insecticide with residual effect
-Surveillance of all immediate contacts for two weeks
-Thorough chemical delousing of clothing of fatal victims of louse-borne typhus
-Treatment of cases with antibiotics

[Note: This fact sheet states “The easiest control method of occasional infestations is to expose infested clothing to a minimum temperature of 70 degrees C for at least one hour.” However, this statement does not clarify whether exposure is in air or water. Exposure to hot air requires far more time than hot water due to the insulating properties of clothes against air. Water penetrates clothing far faster and reduces the lethal exposure time to a fraction of that needed when using air alone.]

Pan American Health Organization, 1982 (4):

-The method of choice is that of mass delousing of the population with insecticide dust delivered by a compressed air duster. Use of shaker cans will also suffice.
-Clothing fumigants can be used if the fumigation is supervised by properly trained personnel.
-Mass laundering of clothing is effective only if a water temperature of 52 degrees

C or more can be maintained. [Duration of exposure to temperature not stated]

American Public Health Association, 2008 (5):

-Prophylactic hand or power dusting of at-risk populations with pesticidal dusts, or impregnation of clothing with residual insecticide. NOTE: There are currently no pesticides registered with the Environmental Protection Agency that are labelled for use in mass-delousing. Therefore, mass delousing cannot be done by U.S. personnel. Personal communication (LCDR Brian F. Prendergast) with preventive medicine personnel from NATO nations participating in the war in Afghanistan showed that none of those nations could legally use pesticides for mass delousing.
-Improvement of living conditions and provision of bathing and laundering facilities
-Quarantine of infested contacts for 15 days after application of residual insecticide
-Surveillance of contacts for 2 weeks
-Treatment of cases with antibiotics

Ethiopia, 1991: The Ethiopian civil war in the early 1990s resulted in a situation where mass delousing (not conducted by U.S. personnel) was deemed necessary and involved 48,628 prisoners of war (6). That International Committee of the Red Cross operation demonstrated that case treatment with antibiotics alone was insufficient to stop the spread of louse-borne relapsing fever. Only when delousing was also done was disease controlled. Delousing was accomplished by bathing prisoners of war and boiling their clothes for 30 minutes. Using these techniques, the number of soldiers deloused per day ranged from 490 to 1215. This study clearly showed that case treatment with antibiotics must be combined with delousing operations to stop the spread of louse-borne disease (7).

References

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2. Woodward, T. E. 1973. *Successful Control of Typhus in Naples*, *1943-44*, in *The Control of Lice and Louse-Borne Diseases*, Pan American Health Organization, World Health Organization, pp. 200-201.

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4. Anonymous. 1982. *Emergency Vector Control After Natural Disaster*, Scientific Publication No. 419, Pan American Health Organization, 107 pp.

5. Heymanm, D. ed. 2008. *Control of Communicable Diseases Manual*, 19th Edition, American Public Health Association, 624 pp.

6. Sundnes, K. O. and A. T. Haimanot. 1993. Epidemic of louse-borne relapsing fever in Ethiopia. The Lancet 342(8881): 1213-1215.

7. World, M.J. 1993. Pestilence, war and lice. Review of Sundnes and Haimanot's epidemic of louse-borne relapsing fever in Ethiopia. The Lancet (8881) 342: 1192.

APPENDIX D. PERMETHRIN IMPREGNATION METHODS AVAILABLE IN THE DOD SUPPLY SYSTEM

NOTE: Technical Guide (TG) 36, *Personal Protective Techniques Against Insects and Other Arthropods of Military Significance*, should be consulted for detailed information on the proper use of these products. TG 36 is available at the Contingency Operations page of the Armed Forces Pest Management Board's Web site: http://www.acq.osd.mil/eie/afpmb

Factory-treated Uniforms: At the time of this writing, all Services except the Navy have fielded factory-treated uniforms. Click here to check the AFPMB Uniform Permethrin Treatment Matrix to assist in determining which uniforms may be treated by the various methods. Do not treat factory-impregnated uniforms with additional permethrin with the single exception listed below. Remember that dry cleaning will completely remove permethrin.

NSN 6840-01-345-0237: INSECT REPELLENT, CLOTHING APPLICATION, IDA KIT, 40% permethrin, 12 kits/box; Click here to check the Material List for current cost. Each kit treats one complete camouflage uniform (blouse and trousers). This technique involves placing each component of a complete uniform set in a re-sealable plastic bag containing the permethrin solution. After two hours, the clothing items are removed from the pouch and hung to dry. The process results in a permethrin treatment that lasts up to 50 washings. Per treatment cost is about $3.50 per uniform.

NSN 6840-01-334-2666: INSECT REPELLENT, CLOTHING APPLICATION, 151-ml bottle,40% permethrin liquid, 12/btls/bx; Click here to check the Material List for current cost. Each bottle provides sufficient permethrin to treat up to eight complete camouflage uniform (blouse and trousers). The resulting permethrin treatment lasts 50 launderings and costs about $1.70 per uniform. However, this is logistically the most difficult and potentially environmentally contaminating process. Certified pesticide applicators must conduct the process, and excess pesticide running off the uniforms during treatment must be contained to prevent environmental contamination. In response to a request from the registrant, the EPA approved a label amendment allowing for uniforms initially treated with this method to be retreated one (1) time with this same product after 50 launderings.

NSN 6840-01-278-1336: INSECT REPELLENT, CLOTHING APPLICATION, AEROSOL, 0.5% permethrin, 12/6 oz cans/box; Click here to check the Material List for current cost. Each aerosol can of this product treats one complete camouflage uniform (blouse and trousers). The application lasts only about six weeks or six washings. Thus, although the per treatment cost of this item is the one of the lowest of the available methods (about $3/treatment), it is one of the costliest in the long term because multiple treatments need to be performed to provide coverage for operations in excess of six weeks.

NSN 6840-01-692-7397: INSECT REPELLENT, CLOTHING APPLICATION,12oz trigger spray, 0.5% permethrin liquid, 6/12 oz bottles; Click here to check the Material List for current cost. Each spray bottle of this product treats two complete uniforms (blouse and trousers). The application lasts about six weeks or six washings. The advantage to this product is that the trigger spray is more transportable by air due to its unpressurized container. The per treatment cost of this item is similar to the aerosol method (about $2.25/treatment).

APPENDIX E. USEFUL LINKS

Defense Centers for Public Health – Aberdeen (DCPH-A) website on the DoD Insect Repellent System

DCPH-A website on Louse-Borne Typhus

CDC guidance on Typhus fever for providers

CDC guidance on body lice prevention and control