I. INTRODUCTION

Preventive medicine concerns are of much greater importance when traveling to developing areas of the world. Many of the routine practices involved in daily living such as eating, drinking, and exposure to the environment may involve a health risk that needs to be addressed to avoid preventable morbidity and mortality.

Preparation of personnel
Personnel involved in overseas operations should be assiduously monitored to keep their routine immunizations up to date. Most immunizations require approximately two weeks to develop adequate protective antibodies, thus once the personnel arrive in country, it is too late to start immunizing. Additionally, certain country specific immunizations may be indicated depending on the type of exposure anticipated. Since tuberculosis (TB) is more prevalent in developing areas of the world, TB screening of the crew should also be updated annually. The skin test (PPD) does not show positive reactions until approximately eight weeks after tuberculosis infection.
Malaria chemoprophylaxis also requires pre-deployment planning. First, the countries to be visited must be researched to determine current sensitivity to antimalarial medications. Secondly, chemoprophylaxis requires dosing before actual arrival in a malaria endemic area. Additionally, personnel must be trained regarding personal protection techniques and supply personnel require lead time to obtain appropriate insect repellents, bednets, etc.

Medical intelligence
Medical intelligence which delineates disease risks of the country visited can identify specific known health risks that may be encountered. Such risk assessments are also valuable to evaluate post travel illness. When seeking medical care this data can increase the clinical suspicion of the medical staff for anticipated medical conditions. This information is often published as preventive medicine guidance by the Joint Command (CENTCOM, EUCOM, SOCOM etc.) prior to deployment to that area of responsibility. Information can also be obtained from a variety of resources within the Navy's medical department.

The primary units tasked with providing disease risk assessments for overseas travel are U.S. Navy's Environmental and Preventive Medicine Units (NEPMUs).

- NEPMU No. 2, Bldg X-336, Norfolk, VA 23511-6288
  DSN: 564-7671 COMM: (757) 444-7671
  MSG: NAVENPVNTMEDU TWO NORFOLK VA//02//

- NEPMU No. 5, Box 143, San Diego, CA 92136-5143
  DSN: 526-7070 COMM: (619) 556-7070
  MSG: NAVENPVNTMEDU FIVE SA DIEGO CA//02//

- NEPMU No. 6, Box 112, Pearl Harbor, HI 96860-5040
  DSN: 471-9505 COMM: (808) 471-9505
  MSG: NAVENPVNTMEDU SIX PEARL HARBOR HI//02//

- NEPMU No. 7, Box 41, FPO NY 09521-4200 (Naples, Italy)
  DSN: 625-4468 COMM: 011-39-81-724-4468
  MSG: NAVENPVNTMEDU SEVEN NAPLES IT//02//

We have two Disease Vector Ecology and Control Centers (DVECC) which can provide vector information:

- DVECC, Naval Air Station, Box 43, Jacksonville, FL 32212-0043
  (904) 772-2424, DSN: 942-2424
Several U.S. Navy Medical Research Units (NAMRU) are located overseas. These units have medical personnel who are familiar with the diseases present locally since they routinely conduct medical research in local populations.

- NAMRU III (Cairo, Egypt)
  FPO New York 09527-1600
  (011) 202-284-1375

- NAMRU II (Jakarta, Indonesia)
  APO San Francisco 96356-5000
  (011) 6221-420-7854

- U.S. Naval Medical Research Institute Detachment (Lima, Peru)
  APO Miami 34031-0008
  (011) 5114-52-1560

The parent command for all the U.S. Navy's preventive medicine resources is

The Navy Environmental Health Center (NEHC)
2510 Walmer Avenue
Norfolk, VA. 23513-2617
(757) 444-7575
DSN: 564-7575
FAX: (804) 444-3672

II. MEDICAL CIVIC ACTION PROGRAMS (MEDCAPs)

- Crowd control
- Facilities available
- Population expected
- Control at entry point
- Catchment area
  - urban vs rural
- Understand environmental exposure of patients
  - shelter
  - water source
  - sewage disposal
  - solid waste disposal
• recreational exposure
• food source
• History and physical examination
  • interpreters
  • noise of environment
• Pharmacy
  • everyone gets something ie. Vitamins, acetaminophen, etc
  • excess medication disposition
• Security
• Conditions seen
  • common illness still common
  • neglected conditions
  • skin infections
  • consumption
  • leprosy
  • vaccine preventable diseases
  • malaria
    ➢ distribution
    ➢ diagnosis
    ➢ treatment
    ➢ prevention
• Ability for hospital admission, follow-up care etc.
• Coordination with local care providers and politicians

III. REFUGEE MEDICINE

Introduction
A sudden influx of refugees aboard sea-going vessels or in camps can easily overwhelm their capabilities to provide adequate living area, potable water, sewage disposal, and medical care. Everyone will be concerned regarding the potential for disease transmission from the refugees. The medical department can evaluate the potential risk of disease transmission and provide information to the crew identifying practical control measures. Prior planning for such contingencies is crucial since a refugee situation may be encountered without advanced notice. The medical department plays a central role in the management of refugees.

Epidemiology for the unit
Personnel involved in these operations should be assiduously monitored to keep their routine immunizations up to date. Most immunizations require approximately two weeks to develop adequate protective antibodies, thus once the refugees arrive it is too late to start immunizing. Tuberculosis screening should also be updated annually. The skin test (PPD) does not show positive reactions until
approximately eight weeks after infection.

Refugee screening for illness and injury
Many times physicians have a tendency to screen and provide definitive medical treatment simultaneously. However, when faced with large numbers of people this is counter productive. The first priority is to identify conditions requiring immediate medical care and infectious diseases requiring isolation. A language barrier may cause a significant delay in the screening process slowing acknowledgment of the patient's chief complaint. A brief questionnaire drafted in the native language may be helpful.

Preliminary screening can be conducted by corpsmen thus allowing physicians, if present, to concentrate their efforts on critical patients. Once critical patients are identified, there must be a n area or space designated for their care. This "inpatient" area should be convenient for medical personnel otherwise, patient monitoring may be compromised. If these spaces are near the refugee treatment area, both personnel and medical supplies for the refugees can be centralized to avoid the duplication of efforts.

Medical intelligence which delineates disease risks in the originating country can increase the clinical suspicion of the medical staff for anticipated medical conditions. This information can be obtained from one of the U.S. Navy's Environmental and Preventive Medicine Units (NEPMU).

Some refugees may have been victims of physical abuse. Injuries such as fractures, burns, gunshot wounds, and stab wounds may be seen. Wound care should receive adequate attention since these people may not have had the benefit of prior medical treatment and they often have been living in less than optimal conditions. Frequent clinical evaluation of patients with traumatic injuries could detect progression of wounds to more serious conditions.

Once the initial screening is completed, "healthy" refugees should have the opportunity to seek medical care at a later time. Future access to medical care may detect significant medical conditions that may have been missed by the initial screening. Some diseases may have been in the incubation phase when the refugees were initially screened.

Diagnostic evaluation and treatment
Diagnostic evaluation while at sea or in camp is limited under normal conditions. Such capabilities are further comprised when a large population of ill patients is suddenly encountered. Thus, empiric treatment based on history and physical findings alone is frequently indicated. This further emphasizes the need to obtain an good history. The simplest form of treatment should be used ie. oral medications vs. IV to preserve limited medical resources. Experience has shown that medical problems in refugee populations usually respond well to basic care.

Refugees may not understand the objectives of initial medical treatment. Thus, when one person receives medication, others may also want the benefit of some type of treatment. Hence, medical
personnel must identify a form of treatment which may be given to the majority of refugees without inducing adverse effects. Multivitamins and other low dosage over the counter medications may be useful for this purpose.

Potential for disease transmission
Medical personnel should consider the route of disease transmission to properly assess the potential threat for further spread. Diseases which are spread by direct contact or via respiratory secretions can be exacerbated when people are crowded together. Enteric infections which result in diarrhea can easily overwhelm already limited sewage disposal facilities. Adequate potable water and sewage disposal can limit the spread of enteric disease.

Those at highest risk for acquiring disease from the refugees are medical department personnel. Simple handwashing is the most important measure to prevent the spread of infections. Furthermore, universal precautions should be utilized when handling potentially infectious body fluids.

Vectorborne disease
Refugees may have travelled from countries which have endemic vectorborne disease. Some examples of vectorborne disease are; malaria, filariasis, dengue fever, encephalitis, etc. When traveling to other ports, medical personnel should be aware that these disease may be introduced into areas where the vectors are present but the actual disease has been previously eradicated. Patients with a suspected vectorborne disease can be identified with active case finding and treated to render them non-infectious to subsequent vectors. Many diseases require a cycle in both the vector and infected host thus, when evaluating unit members for possible vector-borne illness the time required for disease appearance should be carefully calculated.

Malaria
The most commonly encountered vectorborne disease is malaria. Most medical personnel are not familiar with the presentation, diagnosis, and treatment of malaria. A febrile illness without a readily identifiable cause should be treated as malaria if the patient is from an endemic area. Furthermore, patients with other medical conditions which may account for elevated temperatures may also have a concomitant malaria infection. Patients with suspected malaria should also be protected from further mosquito contact. If mosquito contact can not be prevented, the use of DEET, Permethrin treatment of uniforms, bed netting and proper wear of uniforms is recommended. The definitive diagnosis for malaria requires a blood smear showing the parasite. However, most medical personnel have very little, if any, experience preparing and interpreting these blood smears. The misinterpretation of blood smears (false positive) have caused significant public health alarm in the recent past.

Habitability
Refugee protection from the elements should be considered. Exposure to excessive sunlight may aggravate dehydration which is common in refugees. Special efforts should be made to keep families together especially those with young children. A soft nonabsorbent easily cleaned surface for sleeping
would be ideal, if available. The living area should be clean to prevent superficial skin infections. Any disinfectant used in the living area should be diluted or rinsed away to prevent contact dermatitis in those in contact with the disinfected surfaces. Refugee crowding should be avoided to prevent the spread of diseases which are transmitted by direct contact or the respiratory route.

**Potable water**
Potable water should be readily available for consumption and washing. The water should be stored in a cool environment otherwise, warm water will not be consumed as readily. If a make-shift supply of potable water is utilized, it should be protected from contamination.

Many times refugees have only one set of clothing. Thus, clothes washing facilities may be provided along with areas for drying. Refugees may become extremely possessive of what little they have left and, adequate drying space for clothes will be at a premium and may not be readily shared. Furthermore, those refugees infested with lice will need alternative clothing after they are deloused.

If showers are installed, attention must be directed to adequate drainage, the prevention of safety hazards (ie. slippery surfaces), and cleaning of the area. A privacy area for dressing near the showers would also be recommended.

**Food**
Food should be similar to that of their home country, if possible. Standard food handling and storage precautions should be observed to avoid foodborne illness. To prevent stored products pest infestation, food brought by the refugees should not be brought in. After meals, food should not be taken back to the living areas since this may attract insects. Additionally, food taken back to the living area will not be stored under proper conditions thus, allowing bacteria to multiply to dangerous levels.

Meal time organization is crucial since feeding large populations of hungry people in a timely manner is difficult. It is not unusual to see some refugees returning for second helpings before the entire group is fed. Methods to expedite the serving are encouraged to avoid prolong waiting in lines. Security personnel are essential during meal periods to prevent crowd control problems.

If food service personnel are overtaxed, a cold meal may be substituted to allow them to catch up with temporarily neglected sanitation practices. Refugees may also be utilized to augment the labor required to feed large populations. However, these people should be carefully supervised since they may not appreciate the importance of food sanitation practices.

**Sewage disposal**
Sewage disposal facilities should be located for easy access and physically separated from eating and living areas. It may be necessary to construct temporary urinals to accommodate a large population while at sea. If possible, the opportunity for handwashing should be provided for the refugees.
Refugee morale
Because of the crowded situation, there exists a potential for social unrest. Activities such as music, games, cards, may be considered to improve morale. Continual updates regarding their status should be provided through an interpreter. The opportunity for religious practices may also be explored.

Disinfection
The living areas may be sanitized using standard disinfectants such as chlorine bleach. Concentration and contact time instructions should be carefully followed. For example, a 50 ppm chlorine solution should be used with a minimum contact time of 30 minutes. The surfaces should be cleaned first, otherwise residual organic material may inactivate disinfectants. A fresh water rinse is desired if possible. Personnel should be instructed not to mix different cleaning solutions since toxic vapors may be generated.

Conclusion
Prior planning for refugee care will prevent some of the common mistakes associated with inexperienced personnel. The initial acquisition of refugees is usually characterized by mass confusion. A readily available, well thought out standard operating procedure, would provide some direction for the many efforts which must be expended simultaneously when refugees are suddenly acquired.

IV. FIELD ASPECTS OF PREVENTIVE MEDICINE
A conference which was totally devoted to preventive medicine issues for SOF was held at MacDill Air Force Base in Tampa, Florida on 10 and 11 March 1992. This was the first conference exclusively for SOF preventive medicine issues. The purposes of the conference were stated as follows:

- To stimulate preventive medicine interaction among SOF components.
- To establish an interface between SOF and conventional Service/DOD preventive medicine communities.
- Support the CINC's imperatives of maximum readiness and employment of SOF.

The SOF community realizes that preventive medicine issues can be a war stopper or a force multiplier. Therefore, it is expected that increased emphasis will be directed to preventive medicine concerns.

Special forces conduct unique operations which require special consideration by medical personnel. SOF personnel frequently operate in advance of conventional forces without the benefit of the various support services normally available. The possibility of MEDEVAC for ill or injured personnel may not be a viable option if required. Preventive medicine personnel are not normally part of active SOF units.
Thus, preventive medicine personnel are frequently requested from other commands on a temporary basis.

At this conference, each of the services presented the available preventive medicine capabilities. Since future military missions are likely to be joint efforts, we should become familiar with SOF from other services. Those of us in the Navy may be providing services not only to our Navy SEALs but also to Army Rangers. Many times, these units may be geographically separated from their component service support groups.

Medical Civic Action Programs (MEDCAPS) are frequently conducted by SOF personnel. Such operations generated significant discussion at the conference. In the past, MEDCAPS were conducted with the main emphasis on treating acute medical problems in third world populations. However, it is thought that a lasting benefit is not derived from such efforts. The current attitude is to change such mission objectives from doers to teachers. Here again, preventive medicine issues will be given a high priority. If curative tasks are conducted, these efforts can be directed towards a specific health problem rather than attempting to treat all people for a broad spectrum of medical problems. Additionally, in revisiting the same areas continuing consultation and assessment of the effects of past efforts would be possible.

Preparation for MEDCAPS in foreign countries involves several important concerns. Advance planning is essential to the success of these missions. SOF personnel place a much greater emphasis on language and cultural preparation than medical personnel. Medical personnel are frequently asked to conduct MEDCAPS without the benefit of language and cultural preparation. In clinical medicine, the patient's history usually provides the most significant diagnostic information. This aspect takes on an even greater importance when practicing medicine in remote areas without the benefit of laboratory for other diagnostic tests. Furthermore, when the emphasis changes from doers to teachers, it will be difficult to teach those who do not understand what you say.

Those personnel who are involved in MEDCAPS were encouraged to keep simple medical statistics regarding the population they treated. Such information can provide valuable medical intelligence which may not be available from other sources. Future missions to the same area will benefit from these descriptive statistics. Progress towards health improvement of the population can be quantified by comparison of morbidity rates of the same population at two different points in time. Furthermore, the medical team would be able to better prepare the accompanying supplies and personnel conducting these missions.

The use of fixed wing aircraft for vector control was presented at the conference. An Air Force Reserve Unit located in Youngstown, Ohio, maintains four modified C-130H aircraft for aerial spray operations. They have the capability to cover 4,000-150,000 acres/sortie. Needless to say, significant prior planning and preparation would be required to mobilized these resources. Additionally, an aerial spray course is taught in October each year. The point of contact is:
The medical aspects of biological warfare were also discussed. The technology required in the assembly and use of such weapons is not very sophisticated and is readily available. Thus, the potential use of such weapons is a constant concern. The military does have worldwide MEDEVAC capabilities for those contaminated with biological warfare agents. The point of contact for this service is:

Chief Operation Medicine Branch
Medical Division
USAMRIID
Fort Detrick, Frederick, MD 21702
Phone: (301) 619-7655
DSN: 343-7655

Those in the preventive medicine business truly enjoy any opportunity to provide assistance to a receptive audience. If this conference reflects the prevailing attitude within the SOF community, we can predict a future increase in their requests for preventive medicine consultation. This will provide us with the opportunity to communicate the message of prevention to our operational forces and keep the troops healthy and performing at their maximum level.

V. COMMUNICABLE DISEASE SURVEILLANCE AND INVESTIGATION

Definition
From CDC: "Surveillance is the ongoing systematic collection, analysis and interpretation of health data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those who need to know."

Purpose of surveillance
- To establish a baseline rate for the parameters of interest.
- Detect elevated disease rates above the baseline.
- Provide means to describe disease trends.
- Allow initiation and evaluation of control measures.
- Detect unusual health events.
- Provide justification for the allocation of limited health care resources.

Methods of surveillance
- Passive: Receive reports from others.
Example: Review MEDIC program
• Active: Search for the diseases of concern.
  Example: Conduct an outbreak investigation.

Data sources for surveillance
• Use an already established data source if acceptable
• Evaluate validity of data collected. Validity asks: do the data measure what they are supposed to?

Examples of data sources
• MEDIC
• Hospital admissions/discharges
• Death certificates
• Binnacle lists
• Absenteeism records in private industry
• Workman's compensation claims
• Laboratory data: Culture results
• Hospital wards: Temperature logs
• Pharmacy: Requests for antibiotics
• Radiology: Chest X-rays for pulmonary infections
• Safety: Mishap reports

If an existing source of data is not available, create your own system.

Creating a surveillance system
• It should be simple otherwise it will not be used thus, negating its main objective.
• Collection method should be acceptable to those involved.
• System should be flexible to accommodate changes.
• Data collected should represent the condition of interest.
• The system should be sensitive, detect those with disease.
• It should be capable of providing ready feedback.
• Data should be easily retrievable for analysis

How should data be organized
• Organize data to simplify the presentation and increase comprehension.
• Graphs, tables, maps, spreadsheets
• Clearly label all tables and graphs

The collection of data is not the endpoint
• Data should be analyzed and not just filed.
• Realize that the etiology may not be identifiable even after comprehensive analysis of
the data
- By providing feedback to those that generate the data, they may realize the importance of surveillance and play a more active role in submitting information.

VI. INVESTIGATION OF COMMUNICABLE DISEASES

Confirm that a problem exists
- Are people really ill?
- How were the ill diagnosed?
  - History, physical exam, laboratory tests, X-ray, etc.
  - How reliable are the diagnostic criteria?
  - Clinical spectrum of illness?
  - Any asymptomatic cases?
  - Differential diagnosis?
- Are disease rates significantly greater than normal?
- What is the normal incidence and prevalence of the illness?
  - Incidence is the number of new cases expected
  - Prevalence is the number of existing cases expected
- Are there any confounding variables such as arguments or accusations between parties?

Evaluate the data
- Existing data
  - Adequacy of reporting, passive vs active.
  - Is all population at risk included in reporting?
  - Limitations of surveillance methods?
- Obtain additional data as required
- Use a pilot study to test design and feasibility of proposed investigation

Descriptive epidemiology
- Describe what has happened: Who, what, when, where, why, how.

What population is affected?
- Characterize the population affected:
  - Age: Affects immunization status, activities, etc.
  - Gender: Different activities, medicines, etc.
  - Immunization history: Risk from biologicals ie. GBS
  - Travel history: Exposure to endemic disease ie. malaria
  - Family history: Genetic predisposition to disease
  - Medication history: Prescribed and over the counter
Medical history: Recurrence of previous disease
- Rank/Rate: Different exposures
- Occupation: Workplace hazards
- Hobbies: Toxic exposures possible
- Habits: Smoking, alcohol, diet, sexual exposure
- Living areas: Exposure to ill berthing mates
- Eating areas: Common ingestion exposure
  - Compare cases with noncases with different variables
  - Are there subpopulations which are more affected
  - Calculate attack rates for differing populations

Where were the people affected? (geographically)
- Is there a common area involved? picnic, swimming pool, hospital ward, camp, etc.
- What office or work area?
- What building?
- What base or ship?
- What city/neighborhood?
- Construct a spot map of cases

Any contributing environmental conditions?
- What is the existing level of sanitation? Discrepancies?
- What is the water, ice, food, and air source?
- Was there any exposure to infectious insects, plants, animals or people ie. health care worker, farmer, researcher, etc.
  - Any potential vectors present?
  - Disease with seasonal variations may be influenced by the weather
  - What is the disease incidence in surrounding communities?

When were the people affected?
- Graph a temporal distribution from onset of symptoms
- First cases presented when?
- Most cases presented when?
- Incidence declined when?
- Any secondary cases seen?
  - Number of cases per population minus index cases
  - Secondary cases may confuse the temporal distribution
- Consider incubation period for suspected diseases
**Time Example**

- Minutes: Chemical toxins ie. ingested metals
- Hours: Bacterial toxins ie. S. aureus in food
- Days: Bacterial or viral infections ie. impetigo, dengue fever
- Weeks: Bacteria or viruses ie. varicella, syphilis
- Months: Viral hepatitis, latent malaria (P. vivax)
- Years: Leprosy, AIDS, alcoholic cirrhosis

- Is this a point epidemic vs a propagating one?
  - Point epidemic: everyone exposed at the same time
  - Propagating: agent transferred from one host to another ie. HIV

**Intermediate hosts**

- Insects, animals, or people which may continue transmission of disease?
- Such hosts may also be targeted for control measures.

**Evaluate antecedent events**

- What happened prior to the illness?
- What previous exposures were possible?
- Consider possible incubation periods when determining how far back you need to investigate

**Evaluate possible means of transmission**

- The route of transmission may also be targeted for control
- Consider the symptoms and possible transmission routes
- Gastrointestinal symptoms may suggest fecal oral route
  - ie. diarrhea suggests gastroenteritis
- Respiratory symptoms suggest airborne route
  - ie. cough suggests influenza, cold, etc.
- Cutaneous lesions suggest direct contact route
  - ie. chemical contact dermatitis, impetigo, herpes
- Many disease which affect one primary organ system may result in symptoms in other organ systems.

**Establish a hypothesis**

- What exposure is associated with the highest risk of disease?
- Are there any variables which are more common among cases vs healthy or nonaffected individuals.
- Explain; source, route of transmission, and exposure to a susceptible host
- What is the most likely etiology (cause) of this illness?
- How was the agent transmitted?
• How can further cases be prevented?
• What control measures are recommended?
  ▪ Eliminate pathogen ie. sterilize milk, chlorinate water
  ▪ Eliminate pathogen exposure ie. isolate infectious cases
  ▪ Interrupt transmission ie. mosquito control in malaria
  ▪ Protect susceptible hosts ie. immunization of hosts

Document your investigation
• Keep a daily log with specific information
  ▪ A chronology of events can be used as an enclosure
• Continually inform supervisor of investigation progress
• Write a report (should be an ongoing task)
  ▪ Describe initial situation
  ▪ Delineate investigation methods
  ▪ Quantify the problem and impact on operational readiness, health care resources, etc.
  ▪ ie. Number ill, lost manhours, mortality, hospital days
  ▪ Use tables and graphs to simplify data
  ▪ Draw conclusions based on logical reasoning from data obtained.
  ▪ Verbal communication before final report, no surprises
  ▪ Any similar investigations in the medical literature?
  ▪ Recommendations for future surveillance and control
  ▪ Additional studies required?

VII. TUBERCULOSIS CONTACT INVESTIGATION

Be aggressive! Tuberculosis (TB) investigations require knowledge regarding work and living areas. Personnel who share the same work and/or living space with the index case should be considered at risk of infection. Additionally, those who share the same ventilation system if aboard ship or air conditioned quarters are also at risk for infection. Sometimes, the entire crew may be at risk if shipboard.

Characteristics of the index case must be evaluated to determine the infectivity of the disease. If the index case exhibited respiratory symptoms such as coughing, there is an increased chance of spreading the TB organism. Sputum which is strongly positive with the TB organism increases the potential for spread to other crew members. A chest X-ray which shows cavitary pulmonary disease is indicative of a highly infectious patient.

Identify contacts of the index case and conduct initial screening. A tuberculin reaction equal to or greater than 5 mm of induration is indication for isoniazid (INH) prophylaxis in those who are known contacts to active cases of TB. All new reactors should start INH therapy if no medical contraindication exists. Those older than 35 years should be monitored while taking INH.
If less than 2.5% of close contacts are new reactors, the index patient was probably not very infectious. If more than 2.5% are noted to be new reactors, the investigation should be expanded to screen additional potential contacts.

Repeat TB screening three and six months later.
- Nonreactors are screened with PPD skin tests.
- Past reactors should be clinically evaluated and receive a chest X-ray. Three and six months later a clinical evaluation should be performed. Repeat chest X-rays are not normally recommend unless clinically indicated.

At completion of the six month evaluation, those who remain nonreactors should return to routine screening. If secondary cases of TB are detected during the screening program, the investigation should be expanded to include any additional contacts. Decontamination of spaces should be directed toward the ventilation system. Thus, air filters should be cleaned and circulation of fresh air should be increased. Fomite spread does not pose a significant hazard.

VIII. TUBERCULOSIS

Organism
- Mycobacterium tuberculosis

Epidemiology
- Single greatest cause of morbidity and mortality in developing countries with 5 million new highly infectious, smear positive cases each year.
- Rate in Africa: 165 cases/100,000
- Rate in Asia: 110 cases/100,000
  - Solomon Is > PI > S. Korea > Japan, New Zealand, Australia
- Rate of TB in the U.S. was declining until 1984 then an increasing incidence was noted why? Increase of TB in the HIV positive population accounts for most.
- Still a significant health problem in the U.S.
- For the first time, the number of reported cases in the U.S. fell below 20,000.
- Disease spread influenced by:
  - Crowded living conditions
  - Population with little resistance ie. malnourished
- Higher prevalence in: American Indians, Eskimos, migrant workers, people from developing countries, homeless
- In the U.S. increased incidence in:
  - People > 30 years old
Transmission
- Airborne droplet nuclei: From coughing, sneezing, talking
- Milk: Transmits M. bovis if not pasteurized
- Direct transmission: From open skin lesions with manipulation, or processing of tissue (rare)
- Fomites: NO transmission ie. dishes, utensils, clothes, etc.
- Organisms deposited on intact mucosa or skin do NOT invade tissue
- The shared ventilation aboard ships makes TB a high priority for control by the medical department.

Prevention of transmission
- Ventilation with fresh air room changes (> 6/hr)
- Ultraviolet radiation of air
- Covering mouth and nose with coughing, sneezing, etc.
- Properly designed and fitted masks
- Pasteurization of milk

Infection
- Overall 10% of those infected will develop clinical disease
  - 5% develop disease within one year of infection
  - 5% develop disease remote from the time of infection
- Ability of host to respond to infection decreased by: silicosis, diabetes mellitus, immunodeficiency

Infectivity
- Depends on:
  - Symptoms of infected patient ie. coughing
  - Extent of pulmonary involvement ie. cavity
  - Smear positivity

Disease
- Infection does not indicate disease
- Infection is the presence of organisms in the host
- Disease is the pathological changes in tissues
- Disease develops in 5-10% of infected individuals in 2 years
- Disease can occur in any organ system of the body; ie. adenitis, genitourinary,
intestinal, bone, heart, etc.

- Primary portal of entry is the lungs thus, extrapulmonary involvement is less common

**Symptoms**

- Initial infection usually goes unnoticed
- Pulmonary disease usually from a latent focus of initial infection
- Common symptoms include: Night sweats, persistent cough, hemoptysis, unexplained weight loss, unexplained fever and chest pain.
- Consumption = is an old term which reflects the TB patient’s appearance

**Diagnosis**

- History: Fever, weight loss, chills
- Physical exam: Rales
- Laboratory: Anemia
  - AFB smear, false positive possible
  - Culture: Sputum, gastric washings, CSF, pleural fluid, etc.
- Skin test reactivity
- CXR abnormalities: Lower infiltrates vs apical cavities
  - Old disease indicated by apical scarring, calcified peripheral granulomas

**Drug resistance**

- Increasing incidence of drug resistant strains found
  - In New York City
  - 34% of cases were resistant to INH
  - 19% of cases were resistant to both INH and rifampin
  - California reports that 13% of its 4,889 cases reported in 1990 were resistant to at least one front line drug
  - Florida reports an 8% incidence of resistant strains
  - Increased resistance seen in TB cases acquired abroad, especially third world countries
- Factors which encourage the development of resistance
  - When TB patients stop their anti-TB medicines too early; ie. when their symptoms subside
  - Indiscriminate use of anti-TB medicines; ie. for respiratory illness
- Most drug resistant case in foreign born patients
- Treatment of drug resistant TB requires a prolong course of medicine ie. 18-24 months
- Fatal outbreaks of drug resistant TB have already occurred in five states

**Skin test**
- Only the Mantoux method is acceptable
- Multiple-puncture tests not diagnostic only for screening
- ID injection of 0.1 ml of PPD containing 5 tuberculin units
  - Tuberculin syringe 1/4-1/2 inch 27 gauge needle
  - Bevel upward just beneath the skin
  - Produce a pale wheal (6-10 mm)
- If a re-test indicated select a site several cm away from initial site
- Interpret induration 48-72 hours later, not erythema
- Induration is a cell mediated reaction, booster effect seen with repeated PPD testing
- Recording of test results
  - Dose recorded as 5 TU not 1 ml
  - If no induration record zero mm not "neg"
- It takes 2-8 weeks to develop a positive PPD after infection. Re-test if suspicious.

**Criteria for a positive TB test (American Thoracic Society)**
- 5mm: Positive HIV, close recent contact to TB, CXR abnl
- 10mm: From high prevalence area, IV drug user, low income, in long term care facility, medical conditions associated with increased risk of TB, high risk groups identified by public health officials
  - 15mm: All other persons
- Recently, some physicians have been recommending a PPD cutoff of 2mm for HIV positive patients
- Cross reaction with other mycobacteria, the greater the reaction greater probability of M. tuberculosis

**INH (isoniazid) prophylaxis**
- For new reactors and close contacts of active disease
- Dose 5 mg/kg po for TB chemoprophylaxis usually 300 mg
- Increased incidence of INH assoc hepatitis with age
  - 0.3% in those btw 20-34 years
  - 1.2% in those btw 35-49 years
  - 2.3% in those > 50 years
- Adverse effects; Rash (2%), fever (1.2%), jaundice (0.6%), peripheral neuritis (0.2%)
- Pyridoxine Vitamin B 6 at 10 mg q day given concurrently with INH to prevent peripheral neuritis
- Evaluate patients taking INH monthly: history and labs (prn) ie. liver transaminase AST > 3X normal, consider DC INH therapy

**Vaccine**
- Bacille Calmette-Guerin (BCG)
• Used in developing countries
• Interferes with TB surveillance
• Mean reaction of tuberculin skin test in vaccinees is < 10 mm
  ▪ Tuberculin sensitivity wanes after vaccination
• Variable protective efficacy
• Vaccine indications in the U.S. for children with neg PPD:
  ▪ Those who cannot be placed on INH but have continuous exposure to active TB cases.
  ▪ Those with continuous exposure to drug resistant TB
  ▪ Those who live in groups with high TB infection rates (> 1%/yr)
• This live bacterial vaccine is contraindicated in:
  ▪ Immunocompromised; HIV pos, generalized malignancy, leukemia, lymphoma.
  ▪ Immunosuppressed as a result of; steroids, antimetabolites, alkylating agents, radiation.

Treatment
• Most patients can be treated as outpatients
• A brief inpatient quarantine may be indicated to sterilize the sputum or to assure patient compliance
• Pregnancy and breast feeding are NOT contraindications for treatment
• Initially a combination of three or four drugs is used for treatment
• First line drugs include; INH, rifampin, pyrazinamide, streptomycin, and ethambutol
• Relapse is uncommon after an adequate course of therapy
• Most treatment failures are due to patient noncompliance not resistant organisms.
• Duration of therapy six months for uncomplicated cases
• Prolong therapy required for extensive pulmonary or extra-pulmonary disease or for drug resistant strains.

Contact investigation
• Case finding: Identify those at risk
  ▪ Start with closest contacts and work outward
  ▪ Start investigation while awaiting culture results which can take (6-8 wks)
• Case finding is more difficult in HIV infected individuals
  ▪ Diminished reactivity to PPD
• Chemotherapy for new reactors

Unit or Shipboard epidemiology inspection
• Evaluate TB control program
  ▪ Calculate annual PPD test rate from a random sample of medical records.
  ▪ Examine "Tickler" file for INH follow-up
  ▪ Are Those taking INH properly followed at monthly intervals?
• Importance in the USN
  ▪ Units & ship's crew have multiple opportunities to acquire a TB infection:
  ▪ Visit foreign ports where the TB rate is much higher than in the U.S.
  ▪ May be involved in the care of refugees or "boat people" who have a higher prevalence of TB also more drug resistant varieties.
  ▪ Live in crowded spaces with shared ventilation.

IX. VECTOR-BORNE DISEASE

General
• In operational environments, personal protective methods may be the only preventive measures available for vector-borne diseases.
  ▪ Mobility prevents use of more permanent methods.
  ▪ Tactical considerations often constrain vector control techniques.

Methods of personal protection
• Skin repellents
• Clothing repellents
• Protective equipment
  ▪ Bed net
  ▪ Repellent jacket
  ▪ treated tentage

Skin repellent - DEET
• 2 formulations
  ▪ Extended duration lotion
    ▪ 2 oz. tube
    ▪ 33% active ingredient in polymer cream base
    ▪ Preferred formulation for skin application
    ▪ Developed to overcome problems with liquid formulation:
      _ Short duration protection
      _ Damaging to plastics
      _ Poor user acceptance
      _ Dermatitis if used for extended period without washing
  ▪ Liquid
    ▪ 2 oz. bottle
    ▪ 75% A.I. in ethanol
    ▪ Still in stock system for treatment of DEET repellent jacket.
• Application
  ▪ Apply thin film on exposed skin
- Extend application 2” under edges of uniform
- Do not apply to:
  - eyes and lips
  - sensitive or damaged skin (e.g. sunburn, abrasions)
  - extensive areas covered by clothing
- Avoid contact with plastic, rubber, vinyl, elastic

**Clothing repellent - Permethrin**

- 4 types of treatment
  - Aerosol spray
  - 5.1 oz. bottle, 40% emulsifiable concentrate
  - Individual Dynamic Absorption Application (IDAA) kit, 40% E.C.
  - Factory impregnation
    - At this time, it appears that ONLY desert sand uniforms will be treated at the factory, not forest green.
- Aerosol spray application
  - For uniform treatment by individual troop
  - 3/4 can for treatment of shirt and trousers, rest for socks, bednets, etc.
  - Provides 95% protection for up to 5 washings
- IDAA kit
  - For uniform treatment by individual troop
  - One treatment protects for life of uniform
  - **CAUTION:** The kit contains concentrated pesticide which must be mixed by the user. Uniform treatment should be done under supervision of medical personnel.
  - 5.1 oz. bottle
    - Applied with 2 gallon hand compressed sprayer
    - For application by trained and certified medical personnel
    - Can be used for mass treatment of uniforms or for treatment of bed nets and tentage
    - One application good for life of uniform
- Precautions
  - Do not apply to skin
  - Do not treat headgear or underwear
  - Avoid breathing vapors
  - Do not contaminate water - extremely toxic to fish

**Products NOT to be used for personal protection**

- Avon Skin-So-Soft
  - Less efficacious than military repellent
  - Only short duration protection
- Animal flea and tick collars
Contain cholinesterase inhibiting pesticides
  ➢ Dermal effects
  ➢ Systemic effects

Protective equipment
• Bed net
  ➢ Must be tucked in for effective protection
  ➢ Should be treated with insecticide as vectors will bite through the net if user rolls up against it while sleeping
    ➢ Can be treated with Permethrin
      (1) Aerosol
      (2) 2 gallon sprayer
  ➢ Drape net over bed and spray inside with d-Phenothrin before entering
• DEET jacket
  ➢ Wide-mesh fabric overgarment
  ➢ Treated with DEET will repel mosquitoes for 30 days after treatment
  ➢ Can be used while standing guard at night or during other sedentary activities
• Treated tentage
  ➢ Interiors of tentage should be sprayed with Permethrin to kill resting mosquitoes

X. IMMUNIZATIONS

Introduction
• Importance of preventing morbidity and mortality

Reference
• NAVMEDCOMINST 6230.3

Supply
• Use only FDA approved or those vaccines approved by the appropriate Armed Services Drug Review Board
  • May not use expired vaccines unless an extension has been granted (Fort Detrick, MD (301) 663-7117, A/V 343-7117

Preservation
• OPV and Yellow Fever always stored < 0°C (32°F)
  ➢ Evidence of thawing not acceptable
  ➢ Discard YF vaccine within one hour of thawing
• Anthrax, IG and MMR store at 2-8°C (35-46°F)
  ➢ Also protect from light
• Live virus containers treated as infectious waste
  ▪ Burn, boil, or autoclave

Immunosuppression
• Generally wait until after treatment with steroids or antimetabolites
• Avoid live virus vaccines in the immunosuppressed
• HIV test required in past 12 months only before the smallpox vaccine

Hypersensitivity
• Document on Problem Summary Sheet
• Record on SF 601 and a special SF 600
• Examples:
  ▪ Chicken or egg: Mumps, measles, influenza, yellow fever
  ▪ Neomycin: MMR, eIPV, TOPV
  ▪ Streptomycin: TOPV, eIPV
  ▪ Phenol: Cholera, pneumovax, typhoid vaccinations
  ▪ Thimerosal: DPT, HBV (Both plasma derived and recombinant)
  ▪ PCN: No current vaccines with penicillin

Vaccine administration procedures
• Basic life support capability required to be present
• ACLS capability recommended
• Spark kits aboard ships
• No mixing of vaccine in vial or syringe
• Concurrent administration of inactivated vaccines at different sites
• Simultaneous administration of live virus vaccines o/w wait for 30 days
• IG may interfere with live virus vaccines
  ▪ Give vaccine 14 days before IG or
  ▪ Give vaccine 3 months after IG

Minor illness
• Should NOT postpone vaccination

Females of childbearing age
• Avoid live virus vaccines
• OPV and YF are given if the risk of disease is significant
• Generally females should avoid pregnancy for three months after receiving live virus vaccines
• Routine pregnancy tests are NOT required
  ▪ Signed statement on the SF 601 sufficient
Asplenic individuals
  • At increased risk of infection from capsulated bacteria
  • Recommend:
    § Pneumococcal vaccine
    § HIB polysaccharide vaccine
    § Quadrivalent meningococcal vaccine

Adverse reactions
  • Describe in detail in the medical record
  • CDC report required if patient requires hospitalization or loses time (> 24 hours) from duty
    § Identify the biological agent
    § Lot number and manufacturer
    § Date administered and location
    § Type and severity of reaction
  • Do not report mild self limited reactions (< 24 hours)
  • Avoid simultaneous administration of vaccines with significant adverse effects: typhoid, cholera, plague

Occupational requirements
  • Dental and health care workers
  • School teachers
  • Wastewater workers
  • Animal handlers
  • Mortuary personnel
  • Foreign travel

Quarantinable diseases
  • Cholera-5 days, Plague-6 days, Yellow fever-6 days, Smallpox

SPECIFIC VACCINES

Meningococcal vaccine
  • Polysaccharide antigens of groups: A, C, Y, and W135
  • Group A is the most common cause of epidemics overseas
  • Group B is not covered by the vaccine since the capsule is not immunogenic.
    § Most common serotype isolated in the U.S.
• Endemic areas: Subsaharan Africa (espec Dec-June), Northern India, and Nepal
• Epidemics may occur as herd immunity declines
• Protection from immunization declines to 67% within 3 yrs
• Immunization may not prevent carriage

Mumps, measles, rubella (MMR)
• Live attenuated virus
• In 1989 a second dose was recommended if born after 1956 without a physician documented Hx of disease or titers indicating immunity
• Second dose is for primary vaccine failures (2-5%) not to boost waning immunity
• No adverse effect of vaccinating those already immune thus, no need to tests for immunity first
• May temporarily decrease PPD reactivity
• Assure no pregnancy for 3 months but no documented cases of congenital rubella syndrome from immunization
• Vaccination within 72 hrs of exposure may provide protection from measles

Influenza vaccine
• Inactivated virus vaccine: whole or split (used in children)
• Does NOT cause influenza
• Composition changes each year due to antigenic drift
• Season in:
  ▪ Northern hemisphere occurs after December
  ▪ Southern hemisphere is from April to September
  ▪ Tropics all year
• Mandatory vaccine for all USN and USMC personnel on active duty if no medical contraindication

Typhoid vaccine
• Does not prevent paratyphoid fevers
• Vaccine only 70% effective thus "breakthrough" possible
  ▪ Thus not a substitute for good sanitation
  ▪ Immunity can be overwhelmed by a large infective dose ie. 100,000,000 organisms
• Parenteral form is an inactivated bacterial vaccine
  ▪ Two types: Acetone inactivated and phenol treated
  ▪ Rec SQ route for both vaccines
  ▪ Consists of 2 doses 1 month apart
  ▪ Booster every 3 yrs
  ▪ Frequent side effects: Local reactions in 50%
    ➢ Fever in 25%
Absenteism in 15%

- Oral form (Ty21a) is a live bacteria, enteric coated capsule
  - Same efficacy as parenteral vaccine
  - May interfere with malaria chemoprophylaxis, thus separate by 7 days
  - Separate from TOPV by 2 weeks
  - Fewer side effects than parenteral form
  - Booster q 5 yrs
  - Should not be taken with hot fluids or antibiotics

**Tetanus-diphtheria**

- Inactivated toxin
- DPT given to patients < 7 years old
- Use Td form > 7 yrs old (has only 20% of diphtheria toxin)
- Too frequent boosters associated with increased incidence and severity of adverse reactions
- Most cases in the U.S. are in individuals > 50 years old
- Infection does not confer immunity
- Tetanus immune globulin (TIG) for patients who received less than 2 doses of tetanus immunization with a tetanus prone wound.
  - Tetanus prone wounds:
    - Wounds that are seen 24 hours after the injury
    - Highly contaminated wounds
    - Wounds with significant crushing or devitalization of tissue
    - Puncture wounds, frostbite, missile injuries

**Yellow fever**

- Live attenuated virus
- Suboptimal antibody response if given within 3 weeks of cholera vaccine
- Endemic areas: Tropical America (south of Costa Rica to northern Argentina) and Africa
- Booster every 10 yrs
- Side reactions generally mild in 2-5%

**Polio general comments**

- In 1952 57,879 cases reported in the U.S.
- From 1980-1989 86 confirmed cases reported
- IPV introduced in 1951
- OPV introduced in 1961
- Trivalent OPV introduced in 1963
- eIPV introduced in 1987

**Polio: trivalent oral polio vaccine (TOPV)**
• Live attenuated trivalent virus
• Not for patients with contacts that are immune suppressed
• Vaccine associated disease seen 1 case/2.5 million doses
• Can be used in adults if they have received TOPV in the past

Polio: enhanced parenteral vaccine (EIPV)
• Used in those patients over 17 yrs with no Hx of receiving TOPV, since there is a rare risk of TOPV vaccine associated polio
• Used to immunize the immunosuppressed or those with potential contacts with decreased immunity

Smallpox
• Only administered to new recruits when contact with nonvaccinated individuals can be avoided

Anthrax
• Requirement implemented in 1998 as a result of increasing concern over use of biological warfare.
• Six shot series at 0, 2, 4 weeks, 6, 12, and 18 months
• Using a "phased" approach to implementation through the year 2000.
• Personnel deploying to Northeast Asia, and Southwest Asia a priority.
• Tracking is required through DEERS

Plague vaccine
• Formaldehyde inactivated vaccine
• Used when contact with wild rodents is anticipated
• Most disease from developing countries in Asia and Africa
• Dose 1.0 ml IM initially then 0.2 ml 2-4 weeks later with a third 0.2 ml dose 1-3 months after the second dose
• Local reaction and fever in 10% of recipients

Cholera
• Inactivated bacterial vaccine
• Used for administrative purposes only, no medical rec.
• International Certificate of Vaccination is valid for 6 months beginning 6 days after injection
• Booster q 6 months if still at risk or required by country
• Vaccine effective in 50% and lasts for 6 months, significant adverse reactions thus, poor risk/benefit comparison
• Interferes with yellow fever vaccine thus separate by 3 weeks
• Risk of acquiring cholera very low for Americans
• Vaccine does not prevent transmission
• Disease transmitted via contaminated food and water, rarely person to person
  ? No longer recommended as "routine" to avoid false sense of security.

Japanese encephalitis vaccine (JEV)
• 3 dose initial series, VERY EXPENSIVE.
• Vaccine requires 3 doses SQ of inactivated mouse brain vaccine. Booster dose after 3 years.
• Disease areas: Primarily rural areas
  ▪ All year: in Southern India, Thailand, Indonesia, Malaysia, Singapore
  ▪ June-Sept: Korea, Nepal (lowlands), Burma, Northern India, Eastern USSR, China
• Low risk for acquiring disease, but morbidity and mortality very high.

Rabies vaccine
• Human Diploid Cell Vaccine (HDCV)
• Post-exposure vaccination
  ▪ Schedule: 0, 3, 7, 14, and 28 days
  ▪ Also use Rabies Immune Globulin (RIG) within 8 days of the first dose of vaccine, half of dose given at the wound site the other half given IM
• Chloroquine may interfere with antibody response after intradermal administration of vaccine.
• Warning regarding the temperament of animals in developing countries
• Dog rabies NOT controlled in Central and South America, Mexico, SE Asia, and Africa

Hepatitis B vaccine
• Hepatitis B is the most common type of viral hepatitis reported in the U.S.
• Two types of vaccine with similar seroconversion rates:
  1. Plasma derived uses 3 separate inactivation processes (Heptovax-B)
  2. DNA recombinant form derived from yeast (Recombivax HB)
• Interchangability of vaccines thought to be possible
• Recommended when contact with blood or other body fluids is anticipated or prolong visits in endemic areas (Medical personnel).
• Use after exposure to suspected HBsAg contacts via needlesticks, or sexual route
• Post exposure give vaccine within seven days
• Schedule: one dose at 0, 1, and 6 months
• Low dose (0.5 ml) Recombivax regimen for adults < 30 yrs
• Site of injection is deltoid, not buttocks
• No risk in vaccinating carriers or those already immune
• Need for booster dose not yet defined
• Testing for immunity after vaccination not routinely recommended unless a suboptimal response is expected or recipient is at very high risk ie. dialysis workers
• Also protects against hepatitis D which requires hepatitis B for replication

**Hepatitis A vaccine**
• Currently there are two commercially available vaccines, which may be used interchangeably.
• Implemented in 1996, a two dose series given 6 months apart.

**Immune Serum Globulin (ISG) prophylaxis**
• To prevent hepatitis A "Pre-exposure"
• Short term protection of 2-3 months dose = 0.02 ml/Kg
• Long term protection up to 5 months dose = 0.06 ml/Kg
• Since interference with MMR is possible
  ▪ Give immune globulin > 2 weeks after MMR or
  ▪ Give MMR > 3 months after immune globulin
• Dose NOT interfere with TOPV, yellow fever, or inactivated vaccines
• Hepatitis A is rarely severe in children, but they can still spread the virus
• Post exposure prophylaxis has a protective efficacy of 80-90% if administered within two weeks of exposure
• Rare anaphylactoid reactions reported in IgA deficient individuals and those who have received multiple transfusions. They react against the IgA in the ISG.

**Chemoprophylaxis**
• Influenza A - Amantadine 200 md q day
• Meningococcal disease - Rifampin 600 mg q day
• Leptospirosis - Doxycycline 200 mg q week
• Scrub typhus - Doxycycline 200 mg q week
• Plague - TCN
• Malaria - chloroquine, mefloquine, doxycycline, primaquine

**Travelers diarrhea**
• Most common cause is Enterotoxigenic E. coli (ETEC)
• Usually a self-limited illness of 3-5 days
• Prevention
  ▪ Consume water from a safe source otherwise treat it
  ▪ Heat: Bring water to boiling, most reliable method
  ▪ Chlorine available in two forms
     ➢ Household bleach 2 drops per quart shake and wait 2 hours, use 4 drops/qt for cold or cloudy water
PREVENTIVE MEDICINE

- Tablets: Halozone
  - Iodine available in three forms, NOT for pregnant women
  - Crystals not recommended since concentrations are variable
  - Tincture (2%) use 5 drops/qt of water, 10 drops for cold or cloudy water
  - Tablets
  - Hot tap water, although not completely safe, may contain fewer organisms than cold water
  - Filters of questionable value thus, do not rely on them
  - Use bottled water from a reputable source
  - Used carbonated beverages (low pH inhibits bacteria)
  - Be careful with ice, may use contaminated water
  - Hard liquors do not kill bacteria, beer and wine are safe
  - Consume food prepared and held under sanitary conditions
  - Avoid street vendors with high risk food products

- Treatment
  - Hydration replace fluids with sugar and salt solutions
  - One tablespoon of sugar and a pinch of salt in 8 ounces of water
  - Anticholinergic medicines:
    - Not to be used with dysentery symptoms
    - Diphenoxylate (Lomotil) not rec, may be habit forming
    - Loperamide (Imodium) do not use with fever or bloody stools, no CNS penetration
    - Anti-motility drugs may prolong diarrhea ie. shigella
    - Inhibits sweat glands thus increased risk for heat exhaustion
  - Pepto Bismol (bismuth subsalicylate)
    - Not for those ASA allergic, using anticoagulants, or children with a viral infection
    - Warn patient of darkening of stool and/or tongue
    - Decreases the bioavailability of doxycycline up to 50%
  - Kaolin/pectin forms stool but no change in diarrhea frequency

- Antibiotics for travelers diarrhea:
  - Norfloxacin (a fluoroquinolone) 400 mg po bid X 3 days
    - Not for pregnant or children
    - Do not give with nitrofurantoin or antacids
  - Trimethoprim-Sulfamethazole (SEPTRA DS) 1 tablet bid X 3 d
    - Not with sulfâ allergy
  - Pregnant women use ampicillin or erythromycin safe but not as effective.
  - Prophylactic antibiotics not generally recommended

OTHER CONSIDERATIONS WHILE DEPLOYED
Peace Corps mortality study while living abroad 1961-1976

<table>
<thead>
<tr>
<th>Cause</th>
<th>Mortality Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor vehicle accidents</td>
<td>42%</td>
</tr>
<tr>
<td>Illness</td>
<td>22%</td>
</tr>
<tr>
<td>Drowning</td>
<td>14%</td>
</tr>
<tr>
<td>Violence</td>
<td>5%</td>
</tr>
<tr>
<td>Natural disaster</td>
<td>3%</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>14%</td>
</tr>
</tbody>
</table>

Motor vehicle accidents
- Motor vehicle accidents are a major cause of death in overseas travelers. Poor roads, different vehicles, unfamiliar environment, more pedestrians, etc increase chance of MVA.

Death rates for MVA per 10,000 vehicles by country
- Guatemala 54%
- Peru 43%
- Cuba 32%
- Mexico 28%
- Columbia 27%
- Panama 26%
- Costa Rica 17%
- U.S. 3%

References
- BUMEDNOTE 6230 of 28 Mar 90.
- NAVMEDCOMINST 6230.3 of 7 Oct 88.
- BUMED MSGID/GENADMIN //NO6230//
- Morbidity & Mortality Weekly Report (MMWR) from the CDC, Massachusetts Medical...
XI. ORAL SALMONELLA TYPHI VACCINE

In December of 1989, a new oral typhoid vaccine was licensed. It is synthesized from a mutant strain of S. typhi and called Ty21a. This strain is deficient in UDP-glucose-4-epimerase which is an enzyme required for the metabolism of galactose. Without this enzyme the metabolic precursors accumulate resulting in lysis of the bacteria. This Ty21a strain is also deficient in the polysaccharide that covers most of the virulent strains of S. typhi. Because of this built-in self-destruction mechanism, stool cultures haven't recovered this organism from vaccine recipients.

The Ty21a vaccine induces an immune response in greater than 70% of those completing the primary series. The vaccine schedule is one enteric coated capsule every other day for a total of four doses. The capsules are enteric coated to protect the live bacteria from the stomach acids. Therefore, the capsules should not be chewed or taken with hot liquids. Additionally, the vaccine should be taken one hour before meals. The capsules must be refrigerated since they contain live bacteria. Because of the aforementioned precautions, patient education and compliance are essential to assure proper administration of this vaccine.

Contraindications to this vaccine include acute febrile illness, acute gastrointestinal illness, immunodeficiency, or use of antibiotics within one week before or after taking the vaccine. The vaccine is not recommended for children < 6 years old.

Interactions with other medical treatments have been noted. It is recommended that a seven day period should separate the last dose of the Ty21a vaccine from the initiation of malaria chemoprophylaxis using mefloquine. Under severe time constraints, the manufacturer states that a one day separation would be adequate. It was previously suggested that at least a two week period separate administration of this vaccine from the administration of the oral polio vaccine. The possibility of gastrointestinal interferon interference has been postulated but this has not been substantiated. Presently, there are no contraindications to the simultaneous administration of any vaccines with the Ty21a typhoid vaccine.

Besides the ease of oral administration, this vaccine also has the advantage of having significantly less adverse reactions than the parenteral vaccine. The parenteral typhoid vaccines are well known for their adverse local and systemic reactions. Whereas, the oral vaccine has been infrequently associated with nausea, vomiting and diarrhea. Presently, over 400,000 doses have been administered with less than 50 reported adverse reactions, primarily involving gastrointestinal upset which resolves in 12 hours.
This vaccine provides a very convenient means of protecting people from typhoid fever. However, clinicians must remember that even properly immunized individuals can develop typhoid disease. A large infectious dose can overwhelm the vaccine induced immunity. Thus, sanitary precautions regarding food and water consumption must still be emphasized for those individuals in typhoid endemic areas.

The vaccine is manufactured by the Swiss Serum and Vaccine Institute. In the U.S., it is distributed by Berna Products Corporation in Coral Gables, Florida (800-533-5899).

Price information for military installations is provided below:

1-49 doses cost 14.95/dose  
50-99 doses cost 9.95/dose  
>100 doses cost 6.95/dose  
Packaging cost $10.00 per order  
Shipping cost $17-25 per order

XII. ANAPHYLAXIS

Definition
- Acute generalized allergic reaction involving several organ systems

Usual causes
- Drugs, venoms, food

Epidemiology
- Incidence: 0.4/1,000,000 in general population

Signs and symptoms
- Onset
  - May occur in seconds or minutes after exposure
- Cardiovascular
  - Hypotension and shock
- Respiratory
  - Airway edema, bronchospasm, obstruction
- Skin
  - Itching, erythema, urticaria, edema
- Gastrointestinal
  - Abdominal pain

Labs
• EKG, CXR: not required for diagnosis

Differential diagnosis
• Vasovagal reaction: Bradycardia, pallor without cyanosis, no respiratory obstruction or cutaneous symptoms
• Jarisch-Herxheimer reaction: Fever, chills, myalgias, headaches, hypotension

Treatment
• Start immediately
• Epinephrine
  ▪ 1:1,000 IM or SQ (adults 0.2 - 0.5 ml, child 0.01 ml/kg)
  ▪ Repeat in 15-30 minutes as needed
  ▪ Inject at site of allergen to slow absorption
  ▪ Higher dose required in those using Beta blockers
  ▪ 1:10,000 used via IV route (adults 1 - 5 ml)
• Tourniquet
  ▪ Apply proximally if extremity is source of allergen
• Shock
  ▪ IV lines for fluids (NS)
  ▪ Epinephrine
  ▪ Monitor vital signs and urine output
• Laryngeal edema
  ▪ Establish airway and give oxygen
• Bronchial obstruction
  ▪ IV aminophylline 6mg/kg over 15 minutes loading dose then 0.9 mg/kg/hr
  ▪ Nebulized beta adrenergic bronchodilator
  ▪ Hydrocortisone or methylprednisolone if patient previously treated with steroids
• Urticaria or Gastrointestinal reactions
  ▪ Not life threatening
  ▪ Respond to antihistamines ie. diphehydramine

Prevention
• Avoid allergen and potential cross reacting allergens
• Anaphylaxis kit for those with known sensitivity
• Insect sensitive people
  ▪ Avoid outdoor food and garbage
  ▪ Avoid flowers, perfumes, mowing the lawn, walking barefoot outside
• Aware of Hymenoptera insects possible cross reaction
  ▪ Honeybee, yellow jacket, hornet, wasp, fire ant
• Desensitization usually achieved in 12 weeks, then continued every 4-6 weeks

Complications
PREVENTIVE MEDICINE

• Irreversible shock, cardiac arrhythmia, respiratory failure, myocardial infarction, renal failure, death

XIII. TRAVEL MEDICINE
The following is a general discussion for international travel considerations in a bulletized format. Individuals within your command, or dependents may be traveling in countries where health risks are great.

Trip
• Where and what elevation
• How long
• What activities: Rural vs urban, animal contact, health care
• Previous trips: Familiar with overseas travel
• Departure date: Time available to accomplish immunizations

Previous medical history
• Chronic illness: COPD, angina, asthma, seizures

Medications
• Antiseizure meds or beta blockers not compatible with mefloquine
• Anticoagulants not compatible with Pepto Bismol use

Allergies
<table>
<thead>
<tr>
<th>Substance</th>
<th>Contraindicated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfa:</td>
<td>Septra, acetazolamide, fansidar</td>
</tr>
<tr>
<td>Neomycin:</td>
<td>MMR, eIPV</td>
</tr>
<tr>
<td>Streptomycin:</td>
<td>OPV, eIPV</td>
</tr>
<tr>
<td>Phenol:</td>
<td>Cholera, pneumovax, typhoid vaccinations</td>
</tr>
<tr>
<td>Thimerosal:</td>
<td>DPT, HBV (Both plasma and recombinant)</td>
</tr>
<tr>
<td>PCN:</td>
<td>No current vaccines with PCN</td>
</tr>
<tr>
<td>Chicken/egg:</td>
<td>Mumps, measles, influenza, yellow fever vaccines are OK if patient can eat egg products without adverse effects</td>
</tr>
</tbody>
</table>

FOR COUNTRY SPECIFIC RECOMMENDED IMMUNIZATIONS CHECK WITH CDC AND
MEDIC

Travelers diarrhea
- Most common cause is Enterotoxigenic E. coli (ETEC)
- Usually a self-limited illness of 3-5 days
- Noninfectious causes also possible: strange foods, jet lag, altitude, etc.
- Increased risk for those using anti-ulcer medications or past stomach surgery

Prevention of travelers diarrhea
- Consume water from a safe source otherwise treat it
- Heat: Bring water to boiling, most reliable method
- Chlorine available in two forms
  - Household bleach 2 drops per quart shake and wait 2 hrs, use 4 drops/qt for cold or cloudy water
  - Tablets: Halozone
- Iodine is available in three forms, NOT for pregnant women
  - Crystals not recommended since concentrations are variable
  - Tincture (2%) use 5 drops/qt of water, 10 drops for cold or cloudy water
  - Tablets available in camping stores
- Hot tap water although not completely safe, may contain fewer organisms than the cold water
- Filters of questionable value thus, do not rely on them
- Use bottled water from a reputable source
- Used carbonated beverages
- Be careful with ice, may use contaminated water
- Hard liquors do not kill bacteria, beer and wine are safe
- Consume food prepared and held under sanitary conditions
- Avoid uncooked foods of questionable sanitary quality thus, use multivitamins when avoiding fresh fruits and vegetables, peel fruit, avoid milk, avoid room temp sauces
- Avoid street vendors with high risk food products
- Pepto Bismol (bismuth subsalicylate) 60 cc or 2 tablets qid
  - Not for those ASA allergic, using anticoagulants, or children with a viral infection
  - Warn patient of darkening of stool and/or tongue
  - Inhibits E coli enterotoxin
  - Decreases the bioavailability of doxycycline up to 50%
- Prophylactic antibiotics not generally recommended unless underlying medical conditions could be worsened by diarrhea

Nonantibiotic treatment of diarrhea
- Oral rehydration salts (ORS) to replace fluids and electrolytes is the most important
treatment, o/w increases heat stress
- Replace fluids volume for volume lost above maintenance req.
  - Avoid ETOH, "defizz" carbonation
- Avoid solid food and milk products until diarrhea improves
- Advance diet with bland foods: bananas, rice, crackers, toast
- Caution with use of anticholinergic medicines:
  - Not to be used with dysentery Sx
  - Diphenoxylate (Lomotil) not rec, may be habit forming
  - Loperamide (Imodium) do not use with fever or bloody stools, no CNS penetration
  - Anti motility drugs may prolong diarrhea ie. shigella
  - Also inhibits sweat glands thus increased risk for heat exhaustion
- Bismuth subsalicylate 30 ml q 30 minutes, maximum 8 doses/day
  - Remember ASA toxicity
  - Kaolin/pectin forms stool but no change in diarrhea frequency

Antibiotic treatment of diarrhea
- Norfloxacin (a fluoroquinolone) 400 mg po bid X 3 days
  - Not for pregnant or children < 12-18 yrs old
  - Do not give with nitrofurantoin or antacids
- Trimethoprim-Sulfamethazole (SEPTRA DS) 1 tablet bid X 3 days
  - Not with sulfa allergy not if < 2 months old
- Pregnant women use ampicillin or erythromycin safe but not as effective. Paramomycin used for parasites

Malaria insect precautions
- Cover body with clothes at night when the mosquito vector is active
- Sleep in screened or air conditioned areas
- Use repellant diethyl-meta-toluamide (DEET) 30-40% conc.
  - Pediatric precautions such as using low conc and not applying to hands, avoid inhalation, never on wounds or irritated skin, wash off once indoors.
  - Encephalopathy assoc with percutaneous exposure in child
  - Plastic clouding thus careful with contacts and watches
- Insecticide (pyrethrum containing) to kill adult mosquito

Malaria chemoprophylaxis
- Started before trip to assure adequate blood levels and to evaluate side effects
- Chloroquine 500 mg q week
  - Starting 1 week before and continuing for 4 weeks after leaving a malarious area
  - Avoid with psoriasis, porphyria, or G6PD deficiency
  - Stop drug with any visual symptoms
Children are sensitive to overdose
- Pediatric dose is 5 mg/kg of base q week
- Liquid preparations available overseas but not in U.S.
- Pharmacists can pulverize tablets and prepare gelatin capsules
  - Mefloquine 250 mg q week
    - Same schedule as chloroquine, schedule revised Sept 1990
    - Not to be used for self treatment (only prophylaxis) because of side effects especially dizziness
      - Not for patients using anti seizure meds or beta blockers or quinidine or quinine
      - Not for children < 30 pounds, insuff data regarding side effects
      - Consider side effect of vomiting in 3%, dizziness in 1% thus, not in pilots, mountain climbers, etc.
      - Some failures have been noted recently
      - Stop drug with signs of: unexplained anxiety, depression, or confusion which may be a prodrome for a more serious event.
    - Test hepatic function with prolong use
  - Doxycycline 100 mg q day starting 2 days before and for 28 days after leaving a malarious area
    - Side effects: photosensitivity and candida vaginitis
    - Not for pregnant or child < 8 years
  - Primaquine terminal prophylaxis for eradication of the latent liver stage. There is a manufacturer shortage of precursor chemicals
    - Must test for G6PD deficiency first
    - Recent increase in child dose to 0.6 mg base/kg/day
  - No chemoprophylaxis is 100% effective thus, febrile illness up to 3 years after exposure should r/o malaria

Malaria emergency treatment
- Fansidar (sulfadoxine 500 mg and pyrimethamine 25 mg)
  - Three tablets po, not with sulfa allergy
  - Fansidar should not be used prophylactically because of possible side effects
- Symptoms can develop as early as 8 days after initial exposure
- For suspected malaria in a chloroquine resistant area ie.
  - Tropical Africa, SE Asia, Oceania, Amazon region
  - Only as a lifesaving measure
- For those allergic to sulfa: Take 300 mg of doxycycline and three quinine tablets
- Then immediately seek medical care

Acute mountain sickness
- Seen at altitudes over 9,000 feet
- Symptoms of acute mountain sickness include: Headache, dizziness, fatigue,
breathlessness, insomnia, loss of appetite, nausea and vomiting in severe cases

Do not treat insomnia with sedatives (further decreases RR)

Symptoms develop within 8-24 hours after reaching altitude and may persist for 48 hours before subsiding

Prevention of acute mountain sickness

- Spend a few days at 5,000 - 7,000 feet with gradual ascent
- Climb high but sleep at lower altitudes
- Acetazolamide (Diamox) 250 mg bid-tid to increase acclimization but not for treatment (produces metabolic acidosis to stimulate RR) Start before ascent
  - High carbohydrate diet (metabolized to carbon dioxide more rapidly thus, stimulates RR), espec in evening
  - Not prevented with physical conditioning

Shistosomiasis

- Spread via fresh water contact with infected organisms
- No way to distinguish infected water from noninfected water.
- Thus, avoid all fresh water in an endemic area
- Symptoms may occur before stool or urine reveal parasites
- Eggs can be found 6-8 weeks after exposure
- Swim in salt water or chlorinated pools
- After contact with fresh water towel off or use rubbing alcohol immediately to reduce cercarial penetration
- Allow bathing water to stand for 3 days since cercariae survive only 48 hrs
- Endemic areas: Caribbean, S. America, Africa, Asia

Jet lag

- Worse when travel West to East
- Force yourself to adapt to new eating and sleeping hrs
- Do not nap during the day
- Limit alcohol consumption
- Sleeping pills only for 2 days after arrival
- L-tryptophan nonprescription medicine
  - Linked to eosinophilia-myalgia syndrome
  - Not to be used with Prozac leads to agitation and GI distress

Sleep aids

- Halcion (triazolam) a triazolobenzodiapine (0.25 mg at hs)
- Dalmane (flurazepam) a benzodiapine (30 mg at hs)
- Schedule IV drugs thus controlled
• Psychological and physical dependence possible
• Withdrawal possible after prolonged use
• Taken at start of new sleep cycle X 2 days
• Use lower dose in the elderly or those using cimetidine or erythromycin
• Do not use with ETOH, psychotropic meds, anticonvulsants, and antihistamines since CNS depression is additive
• Possible side reactions retrograde amnesia, disorientation
• May intensify depression

Motion sickness
• Symptoms rare < 2 yrs of age and > 50 yrs old
• Affects 90% at some time in their life
• Sx: nausea, vomiting, drowsy, dizzy, abd pain, pallor, diaphoresis
• Pre-pubertal girls affected > boys
• Prevent by keeping head stationary, watching the horizon
• Adaptation is highly specific
• Scopolamine transdermal patches anticholinergic
  ▪ Possible symptoms include: transient anisocoria (dilated pupil on same side as the patch), transient psychosis, increase in BP with a decrease in pulse, cardiac arrhythmias
  ▪ Not for children or those with glaucoma or urinary retention
  ▪ Withdrawal syndrome if used > 3 days
• Antihistamines
  ▪ Meclizine (Antivert) 25-50 mg q day prn
  ▪ Diphenhydramine (Benadryl) 25-50 mg qid prn
  ▪ Not for those with: glaucoma, prostatic hypertrophy, asthma, HTN, hyperthyroidism, cardiovascular disease

Pregnancy and travel
• Pregnancy and breast feeding are not contraindications to administer: ISG, toxoid vaccines, or killed or inactivated vaccines. Only rubella virus is found in breast milk and is not harmful to the neonate.
• No live virus vaccines in pregnant however, OPV and yellow fever may be given if the disease risk is great, rec waiting until the second or third trimester
• Best time to travel is between 4-6 months of gestation since body is adjusted to pregnancy but not yet too bulky
• Airline restrictions for flying
  ▪ May require a letter of approval from physician
  ▪ Domestic regulation no travel after 36 weeks gestation
  ▪ Foreign regulations no travel after 35 weeks gestation
• Cabin pressure equivalent to 5,000 feet (limit 8,000 feet)
  ▪ May see symptoms in anemic pregnant women
Those with sickle cell trait at risk for hematuria
Those with sickle cell anemia may go into crisis
Thus, correct anemia before flight

- Arterial oxygen pressure (mmHg) in:
  MotherFetus
  At sea level 100  32
  At 8,000 feet 55  25.6
- No risk to fetus at standard cabin pressures
- Gas in the body expands 25% at 8,000 feet, caution after surgery
- Oxygen conc remains the same but the pressure pushing it into the lungs is reduced at higher altitudes
  - Humidity on flights < 10% thus, encourage hydration
  - Magnetometers used at airport security checkpoints are not harmful to the fetus
  - Health insurance may not cover delivery in a foreign country
  - Superficial and deep thrombophlebitis
    - Increased risk in pregnant: increase of clotting factors, progesterone effect with venous dilation
- Prevention:
  - Request an aisle seat for frequent walking ie. q hour
  - Wear seatbelt low around pelvis
  - Sit in nonsmoking section
  - Get a seat to allow full leg extension
- More airliners are using recirculated air to save on fuel costs ie. 40% of newly built airliners
  - No scuba diving deeper than 60 feet
    - Wait > 12 hrs after last dive before flying
    - All divers should obtain info regarding decompression chambers before diving
  - No trekking over 7,000 feet

**Commercial air carriers**
- August 1986 FAA mandated a medical kit that contains:
  - Meds (injectable): Dextrose, epinephrine, diphenhydramine
  - Sublingual: nitroglycerin
  - Equipment: Stethoscope, BP cuff, oropharyngeal airways
  - No resuscitation equipment: Defibrillator, ET tube, antiarrhythmics, parenteral analgesics, sedatives
- Supplemental oxygen rec with hemoglobin < 8.5 gms/dl if flight above 22,500 feet. May require advance notice to airline since no personal oxygen tanks allowed.
- Aviation oxygen cylinder is colored yellow: dry and irritating
- Medical oxygen cylinder is green: has moisture thus freezes at high altitudes
- Clear patient for flight if he can walk a city block and climb a flight of stairs
• Cardiac patients carry a copy of most recent ECG and meds in carry-on luggage
• Diabetics carry 2 candy bars, 2 pairs of comfortable shoes, obtain fresh insulin abroad
• In flight deaths
  ▪ Rate 1 per 7 million passengers
  ▪ 56% related to cardiovascular conditions
  ▪ 69% without a reported health problem before departure

Aids risk during travel
• Review mode of transmission with the patient
  ▪ Parenteral route: injections, skin piercing, blood products
  ▪ Sexual route
• Prevention
  ▪ Avoid risk of serious injury, encourage safe driving (seat belt use good vehicle, good roads, etc.)
  ▪ If blood is required check for HIV screening
  ▪ Safe sex trip

Applicable telephone numbers
CDC International travel:
  (404) 332-4559
CDC Malaria information:
  (404) 332-4555
CDC Malaria chemoprophylaxis:
  (404) 639-1610
CDC Primaquine treatment:
  (404) 639-3670
CDC Dengue titers in PR:
  (809) 749-4400
CDC Hepatitis Hotline:
  (404) 332-4555
CDC Yellow Fever Titers:
  (303) 221-6400
CDC JBE information:
  (303) 221-6400
Mefloquine availability Mft:
  (800) 526-6367
Adverse Mefloquine Reaction:
  (404) 488-4046
State Dept Washington DC:
  (202) 647-3401
State Dept Citizens Info:
CHOLERA RECOMMENDATIONS

April 2, 1992

From: Navy Environmental & Preventive Medicine Unit No. 2, Norfolk, VA 23511-6288
To: UNITAS Commands

Subj: PREVENTIVE MEDICINE RECOMMENDATIONS REGARDING CHOLERA

The recent epidemic of cholera which began in Peru in January 1991 has been spreading Northward. In order of reported cholera cases, the countries most affected are; Peru, Ecuador, Columbia, Guatemala, and Mexico. Some countries do not have good reporting mechanisms, thus accurate case numbers may not be readily available. Hence precautionary measures should be observed in all countries during UNITAS port visits.

Cholera is acquired by consuming contaminated food or water. Only a small dose of organisms is required to cause acute gastric enteritis. After an incubation period of 1-3 days, infected patients may note the onset of diarrhea which may be similar to episodes of other enteric infections. Cholera usually begins with painless diarrhea without abdominal cramps or fever. Vomiting is also common. These patients may lose massive amounts of fluids and electrolytes. Severe dehydration may result in hypovolemic shock.

Personnel traveling to cholera endemic areas should observe the following sanitary precautions.

1. Water of uncertain sanitary quality should be treated before consumption. Either boiling or chemical disinfection may be utilized. Water from areas where sewage contamination is likely should be treated with 2.0 ppm of free available chlorine (FAC) for 30 minutes or 2.0 ppm of total bromine residual for 30 minutes. Remember, ice may also be contaminated with bacteria. Additionally, when brushing teeth, precautions should also be followed. Carbonated beverages are generally considered safe because of the acidic pH of the carbonation.

2. Obtain food from approved sources. Food from street vendors or unknown eateries is not
recommended and should be strongly discouraged.

3. Fruits and vegetables should be washed before consumption. Those vegetables which are difficult to wash such as lettuce, should not be consumed. Those fruits which are easily washed or peeled such as apples, mangos, and bananas are safe for consumption. Chemical disinfection of fruits and vegetables can be accomplished by immersion in FAC solution of 100 ppm for 15 minutes or in 50 ppm for 30 minutes. Rinse thoroughly with potable water prior to cooking or consumption. If the sanitary quality of raw salads is unknown, it should not be eaten.

4. Observe proper cooking temperatures which may kill bacteria and inactivate their toxins. Fish and shellfish should be cooked to an internal temperature of 158 degrees F prior to consumption. In July 1991, cholera was isolated from oysters collected from Mobile Bay in Alabama. This emphasizes the need to educate travelers regarding the hazards associated with the consumption of raw or improperly seafood even from developed countries.

5. Observe proper food storage practices. Do not hold perishable foods for longer than four hours of accumulated time between 40-140 degrees F. This is considered the hazardous zone for bacteria multiplication.

6. Handwashing is a very effective preventive measure that is often neglected. Thus, adequate handwashing facilities should be made available for the crew to encourage this practice especially before eating.

7. Specific guidelines can be found in the U.S. Navy's Preventive Medicine Manual P-5010; chapter one (Food Sanitation) and chapter seven (Water Sanitation).

In the U.S., regulations exist which prohibit the emptying of ship's tanks (bldge with 50 miles, and sanitary) within 3 miles) of shore. However, such regulations may not be routinely present or enforced outside the U.S. Thus, ships should exercise caution when making potable water especially when operating near other ships.

Cholera vaccination is NOT recommended for travelers to cholera endemic areas. Presently, The World Health Organization, The U.S. Public Health Service and the U.S. Navy do NOT recommend this vaccine. Past field trials have shown that the cholera vaccine is only 50% effective in preventing cholera disease for a period of 3-6 months while in endemic areas. Vaccination does not prevent excretion of the organism thus, transmission of the infection is still possible. Recipients of the cholera vaccine frequently experience local discomfort and swelling for 1-2 days. Systemic symptoms such as fever, headache, and malaise are seen in 1% of vaccine recipients.

Medical department personnel should be aware of the potential cholera risk. Those patients who present with watery diarrhea may require diagnostic culturing of stool samples or rectal swabs on
thiosulfate-citrate-bile salts-sucrose (TCBS) medium in addition to the usual media. Personnel at risk for cholera are also at risk for other enteric infections such as hepatitis A, typhoid, shigella, salmonella, etc.

In treating patients with suspected cholera, rapid patient rehydration is of primary importance even before definitive laboratory confirmation. Initiate oral rehydration solution (ORS) therapy if tolerated. Intravenous Ringer's Lactate hydration is be used if the patient is severely dehydrated (greater than 10% loss of body weight) or if ORS is not tolerated. Normal saline is less effective since it lacks bicarbonate and potassium. ORS should be initiated as soon as tolerated by the patient. The patients clinical response to hydration should be monitored frequently. Antibiotic treatment for cholera may include; doxycycline, tetracycline, trimethoprim-sulfamethoxazole (Septra) or furazolidone. Anti-diarrheal medications are not recommended.

Since secondary transmission via person to person contact is unlikely, treatment of cholera patient contacts is not required. Mass chemoprophylaxis with antibiotics is normally NOT recommended. However, if a high attack rate is noted in a closed population with a known common exposure such therapy would be considered.

Generally, the risk of acquiring cholera is minimal for personnel that follow standard sanitary precautions (less than 1 per 500,000 visitors to endemic areas). The overall case fatality rate observed in Latin America is reported to be 1.06%.

We encourage prompt reporting of suspected cases of cholera or other significant infectious diseases as required, via Disease Alert Reports (DAR). This information is used to continually update our medical intelligence information.

A current medical reference regarding cholera may be of interest; Swerdlow D and Ries A, Cholera in the Americas, JAMA;267:1495-1499.

For additional information regarding disease risks during the UNITAS operation contact the Epidemiology Department at NEPMU No. 2 at telephone (757) 444-7671 or DSN 564-7671.

XIV. LYME DISEASE

Introduction
- Most common tick transmitted disease in the U. S.
- In 1982 CDC established a surveillance system which had changing cased definitions
- There has been a steady increasing incidence in the amount of Lyme Disease reported why?
  - Increased awareness of the disease
  - Increased recognition of the disease
Misdiagnosis from imprecise clinical definition
- Actual increase in number of cases
  - In January 1991 Lyme Disease became a nationally reportable disease using a new case definition which increased the specificity to exclude noncases.
  - This disease is endemic in the Coastal NE, Midwest, and the West Coast
  - Sporadic cases seen in 43 states
  - Also seen outside the U.S. ie. Europe, Asia
  - Risk of acquiring this disease varies widely by locality

Infectious agent
- A spirochete: Borrelia burgdorferi

Arthropod vector
- *Ixodes dammini*
- *Ixodes pacificus*
- *Ixodes scapularis*

Host
- Main host during immature stage is the white footed mouse
- Main host while an adult is the white tail deer

Disease
- Similar to other spirochetal disease ie. may occur in stages
- Stage 1: EM and/or flu-like symptoms
- Stage 2: Cardiac and neurological symptoms develop within weeks to months
- Stage 3: Arthritis and additional neurological symptoms develops within months to years

Clinical manifestations of lyme disease
- Cutaneous Erythema migrans (EM) formerly ECM
  - Best clinical marker for stage 1 disease
  - Occurs at the site of the tick bite
  - Indicative of local spread of organism
  - Incubation 3-32 days after tick bite
  - Typically painless but may associated with: itching, burning, dyesthesias, adenopathy (regional/general)
  - Constitutional symptoms may also be present
  - May be multiple or secondary in 48% of cases
  - Resolves with or without treatment in 3-4 weeks
Case definition requires > 5 cm size

- Borrelia lymphocytoma
  - Bluish-red swelling or nodule
  - Predilection for earlobes in children and nipple area in adults
  - May last for several months
  - More common in Europe

- Acrodermatitis chronica atrophicans
  - Bluish-red discoloration with swollen skin
  - Seen on hands feet, and olecranon area
  - More common in Europe
  - May culture B. burgdorferi as long as 10 years later

- Cardiac involvement
  - Symptoms of cardiac compromise are: fatigue, syncope, dysrhythmias, atrial ventricular conduction deficits

- Neurological involvement
  - Affects both the peripheral and central nervous system
  - A wide range of symptoms are possible
  - CNS symptoms: aseptic meningitis, encephalopathy with poor memory, mood changes, and somnolence, ataxia, tremor, double vision, facial palsy (Bell's)
  - PNS symptoms: sensory changes, dysesthesia, radiculoneuropathy

- Arthritis
  - Usually asymmetrical and migratory without erythema
  - Attacks may last for weeks to months
  - Symptoms may recur for several years

**Dissemination of disease**

- Symptoms may persist for weeks to months after infection
- Without treatment 5% will have cardiac involvement, 15% will have neurological involvement, and 60% will have arthritic symptoms

**Pregnancy considerations**

- May cause fetal damage however the risk is low
- Transplacentual transmission especially with first trimester infection
- Pregnant women should be treated
  - Uncomplicated and localized disease: oral penicillin V or ampicillin for 14 days
  - Disseminated disease
  - Intravenous penicillin G or cephalosporins
  - Breast feeding allowed
  - No transmission to health care workers

**Differential diagnosis**
• Diagnosis relies predominately on clinical features
• Patient history and physical exam findings utilized
• EM not present in 25% of patients
• Symptoms are protean
• More than 1/3 do not remember a tick bite

Laboratory diagnosis
• Only reliable method to confirm cases is by culturing *B. burgdorferi* from blood CSF of a skin lesion biopsy
  ▪ Culture is technically difficult
• Otherwise use serological methods ie. IgM to *B. burgdorferi*
  ▪ False positives: Cross-reactivity with Treponema and other Borrelia, RMSF, syphilis, autoimmune diseases, neurological disorders such as amyotrophic lateral sclerosis
  ▪ False negatives: Early treatment may blunt the antibody response, low sensitivity of serological tests in early disease

Prevention
• Avoid endemic areas
• Use repellents
• Wear long sleeve shirts and long pants
• Wear light colored clothing
• Inspect skin and clothing frequently for ticks
• Permethrin (0.5%) spray on clothing reduces the numbers of adherent ticks.

XV. MALARIA

Introduction
• Global impact
  ▪ 270 million cases each year (WHO estimate)
  ▪ More than 2 million deaths each year
  ▪ 65% of the world’s population live in a malaria risk area
• Military impact
  ▪ Preventable morbidity and mortality
  ▪ All deploying medical personnel must have sufficient knowledge and skills to diagnose and treat malaria
  ▪ During the Vietnam conflict; lost 1 million man-days to malaria

Organism
• Genus = *Plasmodium*
• Species = *Falciparum*
  ▪ *vivax*
**Preventive Medicine**

- **ovale**
- **malariae**
  - Obligate intracellular protozoan
  - Life cycle
    - Asexual phase in humans
    - Sexual phase in mosquito
  - Life cycle in humans
    - Sporozoites - injected by mosquitoes
    - Hepatic schizonts - rupture in 1-2 weeks
      - Each schizont contains 10,000-40,000 merizoites
      - *Vivax* and *ovale* with latent phase (hypnozoites)
    - Merozoites - enter circulation and invade rbc
      - Ring forms
      - Trophozoites - increased cytoplasm
      - Schizonts - nuclear division, seen in 48-72 hrs
      - Merozoites - 6-24 per rbc, which re-invade rbcs
    - Gametocytes - a subpopulation of merozoites

**Pathogenesis**
- Fever
- Anemia
  - Tissue hypoxia and change in microcirculation
- Immunological changes

**Clinical manifestations**
- Variable incubation period of 8-16 days to months
- Symptoms: Chills, rigors, headache
  - Diaphoresis with defervescence but patients with falciparum may remain febrile
  - Between paroxysms patient may be asymptomatic
- Symptoms can occur before parasites are detected in the blood
  - Thus, sustain suspicion with at least bid blood smears

**Physical examination**
- No specific signs
- May see: splenomegaly, tender hepatomegaly, increased heart rate with flow murmurs
- Lymphadenopathy NOT seen with malaria

**Laboratory tests**
- CBC- Normochromic normocytic anemia, leukopenia, and thrombocytopenia. NO eosinophilia
- UA- Proteinuria from fever
• Electrolytes- Changes associated with dehydration, vomiting, renal failure, etc.
• Serum chemistries- Elevated transaminases, hypoglycemia
• Biologic false positive VDRL

Microscopic diagnosis
• Blood obtained from finger stick from nondominant hand
• If venous blood used, do not use anticoagulant it impairs the staining quality and thick smears "float" off slide
• Both thick and thin smears allowed to air dry, no heat
• Number of parasites varies widely within a few hours thus, repeated smears required
• Blood smears
  ▪ Thick - Allows one to examine a larger sample of blood
    ➢ Once dried, dip in acetone for 1 second
    ➢ Used to detect presence of parasite
    ➢ Cells are pile up 10-20 deep and lysed thus distorted, see 15-40 wbc per oil field
      ➢ Examine 100 fields approx 10 minutes
  ▪ Thin - Used to make a species diagnosis
    ➢ Once dried, fix in methyl alcohol
    ➢ Low sensitivity thus requires prolong search to detect parasitemia, approx 20 minutes
      ➢ Always fixed to minimize distortion, intact rbcs
• P. falciparum attacks rbcs of all ages
• P. vivax and P. ovale attack young rbcs (larger in size)
• Blood smears become negative 72 hrs after treatment
• First r/o falciparum (even if patient using chemoprophylaxis)
  ▪ Accounts for >75% of malaria mortality
  ▪ Perform a pre-treatment Wilson-Edeson (WE) test
  ▪ Characteristics of falciparum parasite on smears:
    ➢ Small rings
    ➢ Double chromatin knobs
    ➢ Multiple rings in individual rbc's
    ➢ Predominance of rings, few trophozoites, no schizonts (unless terminal)
    ➢ Banana-shaped gametocytes
    ➢ High parasitemia rate (ie. >5%)
    ➢ Increased mortality with increased parasetemia

Differential diagnosis
• Malaria can mimic a variety of diseases
• With a positive exposure history the clinician must r/o falciparum malaria by performing serial blood smears as long as the diagnosis is in doubt
• Geographical history is crucial

Complications
• Cerebral malaria
• Severe anemia HCT < 20%
• Jaundice from hemolysis
• Renal failure decreased urinary output
• Vomiting and diarrhea
• Hypoglycemia especially in pregnant women and those with high parasitemia
• Circulatory collapse (algid malaria) hypotension
• Bleeding and clotting disturbances
  § Thrombocytopenia
  § < 5% with DIC
  § Coagulation studies usually normal

Prevention
• Mosquito avoidance (malaria discipline)
  § Minimize outside activities btw dusk and dawn
  § Cover exposed skin
  § Use a repellent diethyl-meta-toluamide (DEET)
    ➢ Caution with children and plastics
    ➢ Liquid 75% concentration in ethanol (NSN: 6840-00-753-4963)
    ➢ Cream 32% concentration with slower release (NSN: 6840-01-284-3982)
  § Sleep under a bednet, screened area, or air conditioning
  § Impregnated bednets and jackets
• Insecticide permethrin (Permanone) to treat clothing
  § Do not treat underwear or headgear
  § Do not treat clothing while being worn
  § Lasts several field washings
  § Not for skin application
  § NSN: 6840-01-278-1336
• Insecticide (pyrethrum-containing) for enclosed spaces
• Entomological control measures
• Folk remedies
  § Avon “Skin-So-Soft” not effective
  § Pet flea and tick collars not recommended

Chemoprophylaxis (general)
• Does not prevent infection, only suppresses blood schizont
• No regimen is 100% effective
• Started before exposure to assure adequate blood levels and detect adverse reactions
• Evaluation of chloroquine use
  ▪ Wilson-Edeson test of urine, positive 12 hours after dose
    ➢ Expect 10% false negative rate (NO punitive use)
    ➢ False positive results with: quinine, primaquine, codiene, ephedrine, and pethidine

CHEMOPROPHYLAXIS MEDICATIONS

Chloroquine
• Regimen: 500 mg (300 mg of base) weekly 2 weeks before exposure while in risk area continue for 8 weeks after exposure
• Base is approximately 60% of diphosphate salt form
• Blood schizontocide
• Rapidly absorbed from GI tract
• Deposited in tissues, thus a loading dose used
• Adverse reactions: Pruritis, nausea, anorexia, headache, bleaching of hair, visual disturbances
• GI adverse reactions avoided by taking with meals or in divided twice-weekly doses
• Lethal dose: Adults - 4 gm, Child 1 gm
• Prescribe accurate amounts to reduce chance of overdose

Mefloquine
• Regimen: 250 mg q week starting 1 week before exposure, and continue while in a malarious area and for 4 weeks after exposure.
• Structure: A 2-aryl substituted analog of quinine
• Well absorbed and extensively bound to plasma proteins
• Clearance by liver, consider hepatic function testing with prolong use
• Does NOT eliminate the hepatic phase of P. vivax infections
• Require primaquine treatment to avoid relapsing malaria
• Drug interactions
  ▪ Cardiac medications: quinine, quinidine, beta blockers, calcium antagonists, other drugs that alter conduction
  ▪ Antiseizure medications
• Adverse reactions
  ▪ Vomiting seen in 3% (Do not take on empty stomach)
  ▪ Dizziness and syncope seen in < 1%
    ➢ Contraindicated for aviation crew personnel
  ▪ High incidence of adverse reactions seen with treatment dose
    ➢ Transient neurological symptoms that spontaneously resolve
• High cost 3.75/tablet is a drawback
**Doxycycline**
- Regimen: 100 mg po q day, start 1-2 days before exposure and during exposure continue for 28 days after exposure
  - Poorer compliance with a daily regimen
  - Not for pregnant women or children < 8 yrs
  - May cause photosensitivity and/or yeast vaginitis
  - Take with meals to avoid GI upset

**Fansidar: pyrimethamine (25 mg)/sulfadoxine (500 mg)**
- Not recommended for prophylaxis (adverse rx)
- May cause severe cutaneous reactions (1/5,000 users)
- Regimen: Three tablets po for suspected chloroquine resistant malaria when medical care is not readily available
  - Never use in patients with sulfa allergy

**Primaquine**
- For terminal prophylaxis when indicated
- A tissue schizontocide for radical cure of relapsing malaria (hyponozoite stage of P. vivax and P. ovale)
  - Contraindicated during pregnancy
  - Check G6PD status first
    - 10% of black males in the U.S. deficient G6PD
    - Dark-hued Caucasian with greater G6PD deficiency
  - Commercially available as a diphosphate salt form
    - 26.3 mg of salt form equivalent to 15 mg of base
  - Schedule: 15 mg q day X 14 days or 45 mg q wk X 8 wks
  - Not effective against P. falciparum blood forms
  - Gametocytocidal against all 4 species

**Proguanil**
- Not available in the U.S.
- Rapid development of drug resistant strains

**Treatment of malaria**
- Early recognition and treatment for falciparum malaria.
- All non-falciparum malaria sensitive to chloroquine.
- Evaluate epidemiologic data regarding resistance to chloroquine or fansidar.
- Chloroquine resistant malaria treated with quinine and fansidar.
- Fansidar resistant malaria treated with mefloquine or quinine and TCN.
- Patients with severe illness treated with IV quinine
• Follow parasitemia, none should persist after 5 days of treatment but gametocytes may persist for weeks.
• Primaquine used to treat liver hypnozoites of relapsing malaria.

Reporting of malaria cases
• All malaria cases should be reported by priority message to the nearest EPMU and DVECC with the following information:
  ▪ Patient's travel history
  ▪ Chemoprophylaxis used
  ▪ Results of pre-treatment WE test
  ▪ Blood smear slide shipment to EPMU both stained and unstained sent for verification in crush-proof containers.

Blood donation
• Must wait 6 months after return from a malarious area if no prophylaxis used because of negligible risk
• Must wait 3 years after return from a malarious area if prophylaxis was used or if had malaria disease

Drug resistance
• Seen in falciparum species only
• Dynamic situation thus, get updates as needed
• Chloroquine resistance classification:
  ▪ RI  Clinical response is normal and parasites disappear but illness recurs in 3 wks
  ▪ RII Patient improves but parasites never completely gone
  ▪ RIII Complete resistance, no change in symptoms or parasitemia
• Resistance has also been documented for: Proguanil, Fansidar, Doxycycline, Mefloquine, ?
• Reversing drug resistance with "efflux modulators" Verapamil

Other diseases spread by mosquitoes
• Dengue fever
• Yellow fever
• Chikungunya fever
• West Nile fever
• Japanese B encephalitis
• Other encephalitides
Desert storm experience
• Three cases of *P. vivax* infections were noted from SE Iraq

XVI. HEPATITIS

Definition
• Inflammation of the liver

Causes
• Drugs: Acetaminophen, disulfiram, INH, BCP
• Toxins: Solvents, degreasors, ETOH, herbicides, insecticides, munitions
• Microorganisms: Bacteria, fungi, parasites, viruses

VIRAL HEPATITIS

Epidemiology
• Over 60,000 cases reported each year in the U.S. (underreported)
  ▪ 44% Hepatitis B
  ▪ 29% Hepatitis A
  ▪ 27% Hepatitis NANB
• Increased risk for liver cancer and other complications

Type A (RNA virus) HAV
• Mode of Spread: Fecal-oral, ie. food, water, etc.
• Incubation period: 15-50 days, mean 28 days
• Infectivity decreases once jaundice appears HAV excreted in the feces 1-2 weeks before Sx
• High subclinical attack rate
  ▪ 90% of children in Mexico, Africa, South America have serological evidence of prior Hepatitis
• A infection by 10 yrs of age
• No role in chronic disease (Fulminant hepatitis < 0.5%)
• Prophylaxis - Immunoglobulin, good hygiene
• Diagnosis confirmed with IgM anti HAV in serum
  ▪ IgM anti-HAV positive one week before Sx, may remain positive for 3-6 months.
• In 50% of cases source not identified

Type B (DNA virus) HBV
• Mode of spread via blood, sexual (homosexual and heterosexual), organ transplant, vertical transmission to neonate
• Incubation period: 45-160 days
Most commonly reported type of hepatitis in the U.S. Accounts for 40-50% of all reported cases. Antibody to core antigen (IgM anti-HBc) is a marker of acute infection. Likelihood of becoming chronically infected varies inversely with age. 90% carriage rates in infants vs 30% at 5 yrs vs 6-10% of acutely infected adults.

Universal testing of pregnant women recommended
- Prevent 95% of infant carriers with HB vaccine and HBIG
- Chronic carrier defined as HBsAg positive > 6 months
- Worldwide HBV is a major cause of chronic hepatitis, cirrhosis, and hepatocellular carcinoma
- Highly endemic in: China SE Asia, Africa, Pacific Islands, Amazon Basin
- Occupational risk for medical and dental personnel
  - HCW acct for 2% of all cases (declining with use of HBV)
  - 33% of cases without an identifiable source

Type C
- Accounts for the majority of non A non B hepatitis
- Mode of spread via blood transfusions similar to type B
- Sexual transmission also possible
- Post transfusion hepatitis history
  - 1960- 33% of recipients
  - 1970- 15% of recipients
  - 1990- 3-10% of recipients
- Screening test licensed in May 1990
  - 50% may be false positives, not specific for acute infection
- Seroconversion may be delayed for 15 weeks after onset of Sx
  - Positive test could represent a previous infection
- Presently no confirmatory test
- Use a surrogate test, alanine aminotransferase (ALT) to detect liver damage
- May remain anti-HCV negative, why?:
  - Poor immune response detectable by current assay
  - Infected with another NANB hepatitis agent
  - A nonviral cause for liver injury
- Progression to chronic active hepatitis and cirrhosis

Type D (RNA virus) Delta
- Requires Hepatitis B for replication (defective virus)
  - Thus, requires co-infection or superinfection
- High prevalence in: Kuwait, Saudi Arabia
  - 20-40% of HBV carriers have anti-HDV
- Routes of transmission similar to HBV
• Sexual transmission possible
• Weaker antibody response ie. IgM anti-HDV positive after Sx

Hepatitis E
• Previous names: Enterically transmitted (ET-NANB) or epidemic NANB
• A distinct type of NANB Hepatitis seen in developing countries after waterborne epidemics
  • High case fatality rate in pregnant women (17-33%)
  • Usually a self limited disease, no carrier state
  • Incubation: 15-64 days
  • Outbreaks in: India, Nepal, Burma, Pakistan, Africa, Mexico, Soviet Union
  • U.S. mft ISG may not protect against (ET) NANB hepatitis
  • No diagnostic test commercially available
  • Control by protecting water supply from fecal contamination

Other viruses that may cause hepatitis
• Epstein-Barr virus (EBV), cytomegalovirus (CMV), rubella, rubeola, mumps, coxsackie B virus, yellow fever

Initial symptoms
• Initial symptoms are nonspecific: Malaise, weakness, anorexia, nausea, vomiting, dull RUQ pain, low grade fever, pruritis
  • Onset can be sudden or insidious

Clinical symptoms
• Even though different agents cause hepatitis they present with similar symptoms

Icteric symptoms
• Jaundice seen with bilirubin > 2.5 mg/dl
• Dark urine seen before icterus is visible
• Scleral icterus
• Light stools from absence of bile pigments in intestine

Nonspecific markers
• Liver enzyme elevation: alanine aminotransferase (ALT) formerly (SGPT), aspartate aminotransferase (AST) formerly (SGOT) ALT is more specific for liver damage
  • Gamma-glutamyl transpeptidase (GGT) is also followed
• Bilirubin elevated
• Prothrombin time is normal in acute phase
• Serum albumin and globulin levels are normal in acute phase
Serologic markers

• HBsAg Marker for both acute and chronic infection
• HBcAg Marker for the virus core
• HBeAg Marker for infectivity, associated with viral replication
• Anti HBs Indicates past infection, shows immunity
• Anti HBc Lifelong marker of infection

Treatment

• No specific treatment

Hepatitis B vaccine

• Licensed in 1982 (plasmid type)
  ▪ Three inactivation steps, each which can inactivate all known viruses, no HIV or HBV transmitted in > 1 million recipients recombinant form marketed
• Schedule of injections: 0, 1, and 6 months
• Reduced dose (5 mcg vs 10 mcg) can be used for those < 30 yrs old
  ▪ Using Recombivax-HB vaccine for all 3 doses
  ▪ Can not mix with Heptovax-B or Energix-B vaccines at 1/2 dose
• Cost approximately 100 dollars for the series
• Recommended by the CDC for all health care workers
• Vaccine efficacy: >90% respond with adequate anti HBs titers, 10 - 15% lose detectable antibody after 5 years

Prevention of hepatitis B

• Proper disposal of sharps
  ▪ Puncture proof container
• Needlesticks
  ▪ Most often by new employees
  ▪ Approximately 50% are preventable
    ▫ No needle re-capping
    ▫ Look for concealed needles
    ▫ Do not put sharps in regular trash
    ▫ Use caution during clean-up
• Needlestick rate for
  ▪ EMS personnel: 145/1,000 employee years
  ▪ Paramedics: 181/1,000 man-years
• Risk of transmission after 1 needlestick 6-30% vs
  ▪ 0.35% for HIV, infectious dose concept
• Barrier precautions when exposed to body fluids
• Handwashing even if barrier precautions used
• Universal Precautions treat all body fluids as potentially infectious
• Discourage tattoos, sexual promiscuity, IV drug use
• Hepatitis B immune globulin (HBIG)
  ▪ Post exposure prophylaxis started within 14 days of exposure
  ▪ Most effective if given within 48 hrs of exposure
  ▪ Can be given at same time as Hepatitis B vaccine at a different site

Prevention of other types of hepatitis
• Sanitary precautions for food and water
• Immune globulin (IG) 0.06 ml/Kg
  ▪ Used for pre or post exposure prophylaxis for Hepatitis A
  ▪ Post exposure dose must given within two weeks of exposure

Chronic health effects of hepatitis B, C, NANB
• Carrier state may develop
• Chronic active hepatitis with chronic jaundice
• Chronic persistent hepatitis with elevated liver enzymes
• Liver cirrhosis
• Liver cancer

Reporting requirements
• Submit a Disease Alert Report (DAR) for suspected cases
• If child is infected, what is parent's occupation?

XVII. GONORRHEA

Organism: Neisseria gonorrhoeae
• Nonmotile, nonspore-forming gram negative coccus
• Grows in pairs with flattened adjacent sides

Epidemiology
• Incidence approximately 324 cases per 100,000 population
• Highest attack rates in the 20-24 age group
• More cases reported in men (women without symptoms)

Transmission
• Perinatal transmission
• Sexual intercourse
  ▪ Male to female risk approximately 50% per contact
  ▪ Female to male risk approximately 20% per contact
Rectal intercourse also effective transmission
- Less transmission via fellatio and cunnilingus
- Inanimate objects have not been associated with transmission ie. toilet seats

**Incubation period**
- Usually 2-5 days in men
- Variable incubation period in women
  - Most have symptoms within 10 days

**Typical clinical manifestations**
- Males: Acute urethritis (urethral discharge and dysuria)
  - Small proportion of men remain without symptoms
- Females: Cervicitis and/or urethritis
  - Vaginal discharge, dysuria, menorrhagia, vaginal bleeding

**Pharyngeal infection**
- Mostly without symptoms
- Pharyngitis and cervical lymphadenitis
- May lead to septicemia

**Anorectal infection**
- Mostly without symptoms
- Acute proctitis, anal pruritis, discharge, bleeding
- Positive culture in 40% of women with uncomplicated GC

**PELVIC Inflammatory disease (pid)**
- Ascending genital infection
- Occurs in 10-20% of women with GC
- Symptoms: Abdominal pain
- Findings: Fever, leukocytosis, increased ESR, adnexal tenderness, cervical motion tenderness
- Complications of infertility 20% after one episode, 50-80% after three episodes

**Disseminated GC**
- Occurs in 0.5-3% of patients with GC
- Symptoms: Fever, skin lesions, arthritis
- Skin lesions first macular then pustular
- Most common cause of arthritis in adults
- Differential Dx: Other bacteremias, inflammatory arthritis meningococcemia
- Dx best at mucosal site, only 10-30% of blood cultures are positive.

**DIAGNOSIS**
Gram stain
- Decolorizing step is critical
- Confused with many coccobacillary forms (short rods)
- Increased sensitivity with: Males, patients with Sx, genital location for site
- Gram negative intracellular diplococci (GNIDs)
- Equivocal if organisms only seen extracellularly or if atypical organisms are seen in polys

Obtaining the specimen
- Males use a Calgiswab and insert 2-3 cm
- Females rotate swab in external os of cervix
- Rectal insert swab 2-4 cm, discard if heavily contaminated with feces

Cultures
- Single culture is >95% sensitive in men with Sx, only 80-90% sensitive in women
- Dual inoculation on selective and nonselective media gives the highest yield
- Optimal growth at 35-37°C in 3-5% CO₂

Treatment
- Uncomplicated urethral GC
  - Ceftriaxone 250 mg IM effective at all anatomic sites
    - Safe in pregnant women
    - May cure incubating syphilis
    - Not for PCN allergic patients (cross reactions)
  - Spectinomycin 2.0 gm IM
    - Effective for genital and rectal GC
    - Not for pharyngeal GC
    - Does not cure syphilis
  - Amoxicillin 3.0 gms po
    - Only if suspected strain is susceptible
- All patients also treated for coexisting chlamydia infection with doxycycline 100 mg bid X 7d or erythromycin 2.0 gm divided doses per day
- Disseminated GC patients and PID patients usually hospitalized for parenteral antibiotics

Epidemiologic treatment of contacts

Antibiotic resistance
- Prevalence of resistance is increasing
- Do not use PCN alone to treat GC

Contact tracing
Prevention
• Health education to change sexual behavior
• Condoms synthetic
• Nonoxynol-9

XVIII. CHLAMYDIA

Organism: Chlamydia trachomatis
• Obligate intracellular bacteria

Epidemiology
• Most common cause of bacterial sexually transmitted disease in the U.S. (35-50% of NGU)
• Estimated 4 million cases each year in the U.S.
• Significant morbidity and long term sequelae in women and newborns thus, an important public health problem
• Coinfection in 20-50% of patients with GC

Transmission
• Perinatal transmission
• Sexual intercourse

Incubation period
• Usually 7-14 days or longer

Typical clinical manifestations
• Sx usually indistinguishable from GC

Diagnosis
• Cultures are the most sensitive and specific
  ▪ Expensive and difficult to perform
• Direct antigen tests
  ▪ Less expensive but not as sensitive or specific
• ELISA has a colorimetric endpoint
  ▪ Specificity is 96% but sensitivity is only 81%
• Fluorescein monoclonal antibody
  ▪ Specificity is 96% sensitivity is 93%
• Microimmunofluorescence (MIF) test, serological
  ▪ Detects antichlamydial IgG antibodies
  ▪ Not commercially available
Gram stain > 5 PMNs per oil emersion field without GNID
Major concern is the predictive value of these tests in a low prevalence population

Complications
- Women
  - Salpingitis
  - Infertility
  - Ectopic pregnancy
- Men
  - Epididymitis - Cause of 50% of epididymitis in men > 35 old

Treatment
- For uncomplicated urethral, endocervical, or rectal infections
  - Doxycycline 100 mg po bid X 7 days or
  - TCN 500 mg po qid X 7 days or
  - Alternative regimens
    - Erythromycin base 500 mg po qid or
    - Sulfisoxazole 500 mg qid X 10 days

Test of cure
- Not necessary

Complications
- Women
  - Salpingitis
  - Infertility
  - Ectopic pregnancy
- Men
  - Epididymitis - Cause of 50% of epididymitis in men > 35 yrs old

Prevention
- Same measures as for GC
## DIFFERENTIAL DIAGNOSIS AND TREATMENT OF GENITAL ULCERATIONS

<table>
<thead>
<tr>
<th>Etiology</th>
<th>Chancroid</th>
<th>Granuloma Inguinale</th>
<th>Lymphogranuloma Venereum (LGV)</th>
<th>Primary Syphilis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Incubation period</strong></td>
<td>12 hrs - 3 days</td>
<td>3-6 wks</td>
<td>3 days - several wks</td>
<td>3 wks</td>
</tr>
<tr>
<td><strong>Initial lesion</strong></td>
<td>Single of multiple, round to oval, tender deep ulcers with irregular outlines, ragged and undermined borders and a purulent base</td>
<td>Soft, non-tender papule(s) that forms irregular ulcer with beefy-red, friable base and raised, &quot;rolled&quot; borders</td>
<td>Evanescent ulcer (rarely seen)</td>
<td>Non-tender, eroded papule with clean base and raised, firm, indurated borders; multiple lesions occasionally seen</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>Undetermined (months)</td>
<td>Undetermined (years)</td>
<td>2-6 days</td>
<td>3-6 weeks</td>
</tr>
<tr>
<td><strong>Site</strong></td>
<td>Genital or perianal</td>
<td>Genital, perianal, or inguinal</td>
<td>Genital, perianal, or rectal</td>
<td>Genital, perianal, or rectal</td>
</tr>
<tr>
<td><strong>Regional adenopathy</strong></td>
<td>Unilateral or bilateral tender, matted, fixed, adenopathy that may become soft and fluctuant</td>
<td>Subcutaneous peri-lymphatic granulomatous lesions that produce inguinal swellings and that are not lymphadenitis (pseudobubos)</td>
<td>Unilateral or bilateral firm, painful inguinal adenopathy with overlying &quot;dusky skin&quot;; may be fluctuant and develop &quot;grooves in the groin&quot;</td>
<td>Unilateral or bilateral firm, movable, nonsuppurative, painless inguinal adenopathy</td>
</tr>
<tr>
<td><strong>Diagnostic tests</strong></td>
<td>Smear, culture in blood, and/or biopsy of lesion; smear from aspirated unruptured lymph node</td>
<td>Biopsy; touch preparation from biopsy stained with Giemsa</td>
<td>LGV complement fixation test</td>
<td>Dark field examination, VDRL, FTA-ABS</td>
</tr>
<tr>
<td><strong>Treatment of choice</strong></td>
<td>Sulfoxazole 4gm initially, then 1gm qid x 2 wks</td>
<td>Tetracycline 500mg qid x 3 wks</td>
<td>Tetracycline 500mg qid x 3 wks</td>
<td>Benzathine penicillin G 2.4 million U IM</td>
</tr>
<tr>
<td><strong>Alternate drug</strong></td>
<td>Tetracycline 500mg qid x 2 wks</td>
<td>Streptomycin 3gm qid x 3 wks</td>
<td>Benzathine penicillin G 2.4 million U IM</td>
<td>Tetracycline 500mg qid x 3 wks</td>
</tr>
</tbody>
</table>