

Family Health Ministries

Supporting Haitian communities in *their* efforts to build and sustain healthy families



Provider Guide

Symptoms, Diseases, Treatment and Prevention

for FHM Mission Teams

Compiled Summer 2009 by Tiffany Wedlake, MD
Reviewed Summer 2012 by Carol Baker, PhD, RN

INTRODUCTION

This Provider Guide was put together with the purpose of equipping the providers who travel to Haiti with Family Health Ministries for the practice of medicine in Haiti. Medical practice in Haiti like most developing countries has a distinctly different feel than practice in the United States. The lack of resources for even the most basic tests can often frustrate medical providers who are accustomed to confirming their diagnosis with labs and x-rays. In Haiti, few people have the resources to pay for labs and many tests are not available within a reasonable distance. Diagnosis and treatment is based primarily on history and physical.

The sections of this manual are designed to help you use the history and physical to arrive at an appropriate treatment. I have tried to group diseases by symptoms, including details of diseases that are less common in the US or are diagnosed or treated differently in Haiti. I have also included many appendices to cover other topics of importance.

I want to challenge you to remember the importance of providing education to your patients about the basic preventive care (immunizations, vitamin A, appropriate nutrition, hygiene, sanitation, clean water, bed nets). Lasting improvement in the communities' health can be accomplished even through short-term trips when the providers leave behind knowledge.

Lastly, I want to remind you of the real purpose of this ministry: to be the hands and feet of Christ. Christ challenged us to "care for the least of these." On this trip you will be answering that call. During your time in Haiti, please keep your eyes on the Great Physician who can heal not only illness but can change hearts. Let Him use this time to change your heart and use your hands and feet to change other's hearts as well.

Sincerely,

Tiffany Wedlake, MD
Family Health Ministries, Intern

Acknowledgments: This Guide was compiled with the help of Audrey Parker, RN.

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IMPORTANT DISCLAIMER

This “Provider Guide” is intended for use by individuals traveling with Family Health Ministries. It is a collection of information intended to diagnosis and treat common diseases that occur in less developed counties where standard diagnostic testing is limited. This guide is not intended to substitute for professional medical judgment and intervention. Please note the following:

- Medicine is not an exact science. The art of diagnosis is a learned activity, taught through experience and training. FHM only allows currently certified medical personnel to provide patient care at FHM sanctioned clinics.
- Not all possible differential diagnosis for disease symptoms may be listed in this guide.
- Only the most common symptoms are listed for each disease.
- General descriptions for common diseases are included in this provider guide but may not be reflective of presentations of the disease state in other low resource countries. How a disease manifests itself may vary according to particular strain of infecting organism, the environment, the age and ethnic background of the patient. For example, the symptoms of Chlorea may present very differently in Haiti than in a country like India.
- Only the most common and cost effective drugs for therapy are listed. More effective alternative drugs may or may not be available in Haiti.
- Every effort has been made to double check all recommended doses in this provider guide, but it is essential for providers to check all unfamiliar drugs against another reference if they are unsure of the correct use and dosage.
- Please make sure that you are familiar with any precautions and possible side effects to any therapy prescribed and that you review these with the patient prior to their departure.
- It is ultimately the responsibility of the provider using this provider guide to execute appropriate diagnosis and subsequent care.

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RASH

Differential Diagnosis

Puritic (itchy) Rash:	Nonpuritic Rash
<ul style="list-style-type: none"> • Scabies • Eczema • Tinea corporis • Contact dermatitis • Chicken pox (Varicella) • Pinta • Tungiasis • Cutaneous larva migrans 	<ul style="list-style-type: none"> • Leprosy • Pinta • Yaws (eradicated from Haiti in the 1950s) • Tinea Versicolor • Measles • Rubella • Zinc Deficiency • Malnutrition • Pyteriasis rosea • Erysipelas
Maculopapular Rashes	Hypopigmentation
<p>Extensive</p> <ul style="list-style-type: none"> • Measles • Dengue • Typhus • Chicken pox • Scabies • Secondary Syphilis • Rubella • Body Lice <p>Sparse</p> <ul style="list-style-type: none"> • Gonococemia • Typhoid rose spots • Flea bites • Cutaneous myiasis • Kaposi's sarcoma • Lichen planus • Tungiasis (chigger/flea type bite) • Cutaneous larva migrans 	<ul style="list-style-type: none"> • Postinflammation • Pityriasis alba • Pinta • Tinea versicolor • Vitiligo • Leprosy • Yaws • Leishmaniasis

(continued on next page)

Nodules	Plaques/crusts
<ul style="list-style-type: none"> • Onchocerciasis (Africa) • Cutaneous myiasis • Kaposi's sarcoma • Erythema nodosum • Drancunculiasis (Africa) • Fungal infections • TB abcess • Rheumatoid disease • Leprosy • Yaws • Gout • Pyomyositis 	<ul style="list-style-type: none"> • Fungal infections • Kaposi's sarcoma • Pinta • Leprosy • Psoriasis • Leishmaniasis (Latin America/S. Amer) • Impetigo • Eschar (from any cause)
Urticaria	Petechiae
<ul style="list-style-type: none"> • Drugs • Schistosomiasis • Strongyloidiasis • Gnathostomiasis (larva migrans profundus) • Loiasis (Africa) 	<ul style="list-style-type: none"> • Meningococcaemia • Typhus • Viral Hemorrhagic Fevers (Dengue,...) • DIC
Vesicles	Pustules
<ul style="list-style-type: none"> • Herpes zoster • Herpes simplex • Varicella • Papular urticaria • Vasculitis • Monkey Pox (Africa) • ORF 	<ul style="list-style-type: none"> • Bacterial infection • Irritant folliculitis • Psoriasis

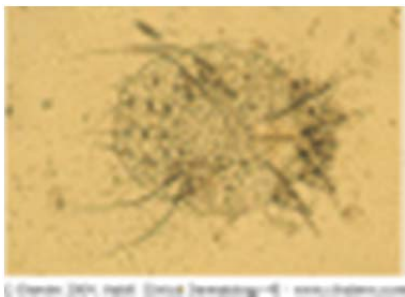
SCABIES

(from Habif on MDConsult)

Signs and Symptoms

- Nodules on the penis and scrotum
- Rash present for 4 to 8 weeks has suddenly become worse
- Pustules on the palms and soles of infants
- Nocturnal itching
- Generalized, severe itching
- Pinpoint erosions and crusts on the buttocks
- Vesicles in the finger webs
- Diffuse eruption sparing the face
- Patient becomes better, then worse, after treatment with topical steroids
- Rash is present in several members of the same family
- Patient (especially an infant) develops more extensive rash despite treatment with antibiotics and topical medications

Sarcoptes scabiei in KOH wet mount



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Treatment

Lindane or Permethrin (permethrin is drug of choice and can be used in all ages; lindane is only approved for above age 2)

APPLICATION TECHNIQUE FOR PERMETHRIN AND LINDANE.

- The cream or lotion is applied to *all skin surfaces* below the neck and the face in children. Patients with relapsing scabies and the elderly should be treated from head (including the scalp) to toe. One ounce is usually adequate for adults. Reapply medicine to the hands if hands are washed.
- The nails should be cut short and medication applied under them vigorously with a toothbrush.
- A hot, soapy bath is not necessary before application. Moisture increases the permeability of the epidermis and increases the chance for systemic absorption.
- If a patient has bathed before lindane administration, the skin must be allowed to completely dry to prevent excessive absorption. Adults should wash 12 hours after application, and infants should be washed 8 to 12 hours after application. One application of either medicine is considered adequate. Many clinicians prefer two applications 1 week apart.

Notes: Patients should be told that it is normal to continue to itch for days or weeks after treatment and that further application of medication is usually not necessary and worsens itching by causing irritation. Bland lubricants may be applied to relieve itching.

Ivermectin : Adult and children over age 8: take 12 mg po day 1 and day 8 (or 200 to 250 ug/kg on day 1 and day 8 or 400 ug/kg x1)

Sulfur (a mix of 6% (5% to 10% range) precipitated sulfur in petrolatum or a cold

cream base.)

Sig: applied to the entire body below the neck once each day for 3 days, bathe 24 hours after each application.

Notes: Sulfur applied in this manner is highly effective, but these preparations are messy, have an unpleasant odor, stain, and cause dryness.[8] Sulfur in petrolatum was thought to be safer than lindane for treating infants, but the safety of topical sulfur has never been established.

ENVIRONMENTAL MANAGEMENT

Intimate contacts and all family members in the same household should be treated. The spread of scabies via inanimate objects occurs. **Wash all clothing, towels, and bed linen that have touched the skin.** Bed linens, floors, and chairs should be vacuumed (if available) and/or cleaned.

*Can place mattresses, chairs, etc.. outside in hot weather for 1- 3 day and it will help to kill the mites (this should not be done in addition to cleaning) from Ted Kuhn, MD, Med Director MTW

TINEA CAPITITIS

Signs & Symptoms/Clinical Presentation:

Most forms of tinea capitis begin with one or several round patches of scale or alopecia.

- Inflammatory lesions, even if untreated, tend to resolve spontaneously in a few months; the non-inflammatory infections are more chronic.
- Patchy alopecia plus fine dry scale plus no inflammation
- Short stubs of broken hair (“gray patch ringworm”): *M. audouinii*
- Hairs broken off at surface (“black dot ringworm”): *T. tonsurans* (most common), *T. violaceum*
- Patchy alopecia plus swelling plus purulent discharge: *M. canis*, *T. mentagrophytes* (granular), *T. verrucosum*
- Kerion is a severe inflammatory reaction with boggy induration: any fungus, but especially *M. canis*, *T. mentagrophytes* (granular), *T. verrucosum*

Treatment

Drug	Dose	Duration
<u>Griseofluvin</u> (250-, 333, and 500 mg tablets or suspension)	15 to 25 mg/kg/day (microsize) May increase to 25 mg/kg Or 15 mg/kg (ultra microsize)	6 to 8+ wk
<u>Terbinafine</u> (250-mg tablet)	<20 kg: 62.5 mg qd 20 to 40 kg: 125 mg qd >40 kg: 250 mg qd	2 to 4 wk
<u>Itraconazole</u> (100-mg tablet or oral suspension) Note: The oral solution is better absorbed.	5 mg/kg/day 3 mg/kg/day (oral suspension) Capsule: simplified dosing 10 to 20 kg: 100 mg qod 21 to 30 kg: 100 qd 31 to 40 kg: 100 mg and 200 mg on alternate days 41 to 50 kg: 200 mg qd >50 kg: 200 to 300 mg qd	4- to 6-wk course or pulse dosing with 1-wk treatment intervals for 2 to 3 consecutive months
<u>Fluconazole</u> (50-, 100-, and 200-mg tablets or oral suspension)	5 mg/kg/day 6 mg/kg/day 8 mg/kg once weekly	4 to 6 wk 20 days 4 to 16 wk

Adapted from Elewski BE: J Am Acad Dermatol 2000;42: 1–20 and Gupta AK, et al: Pediatr Dermatol 1999;16: 171.

TINEA VERSICOLOR

Signs and Symptoms

Lesions begin as multiple small, circular macules of various colors (white, pink, or brown) that enlarge radially, color is uniform on the individual but can be hypopigmented or hyperpigmented.



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Treatment

Topical:

Ketoconazole 2% shampoo, used as a single application or daily for 3 days, is highly effective and is the *treatment of first choice*. Apply the shampoo to the entire skin surface from the lower posterior scalp area down to the thighs. The shampoo is left in place for 5 minutes and then rinsed thoroughly. Wash the scalp with the shampoo at the same time.

Selenium sulfide suspension 2.5%. - applied for 10 minutes every day for 7 consecutive days

Terbinafine solution (lasmisil solution 1% spray bottle) - spray to the effected areas twice a day for 1 week

Oral:

Fluconazole - 300 or 400 mg given as a single dose and repeated if needed after 2 weeks, was very effective

Ketoconazole. - A single dose of 400 mg of ketoconazole is effective. Prophylaxis with 400 mg once monthly resulted in no recurrence during follow-up of 4 to 15 months. Efficacy can be enhanced by refraining from antacids and taking the drug at breakfast with fruit juice. The patient should not bathe for at least 12 hours after treatment; this allows the medication to accumulate in the skin.

Terbinafine or griseofulvin taken orally is not effective.

LEPROSY¹

Background

- Leprosy is caused by *Mycobacterium leprae*, an obligate intracellular acid-fast rod.
- The majority of people exposed to patients with leprosy do not develop the disease because of their natural immunity.
- Incubation period is 3 to 5 yr.
- 2006 Leprosy Cases in Haiti: 22 new cases, 12 multibacillary, 12 in females, 7 in children under age 15, 1 with level 2 disability (from PAHO Situation Report: Leprosy in the Americas, 2007)

Leprosy has been classified according to the WHO system into:

1. Paucibacillary leprosy defined as fewer than five skin lesions with no bacilli on skin smear.
2. Multibacillary leprosy defined as six or more skin lesions and may be skin-smear positive.

Signs and Symptoms

- A skin lesion: most common initial presentation
- Sensory loss
- Anhidrosis
- Neuritic pain
- Palpable peripheral nerves
- Nerve damage (most commonly affected nerves are ulnar, median, common peroneal, posterior tibial, radial cutaneous nerve of the wrist, facial, and posterior auricular)
- Muscle atrophy and weakness
- Foot drop
- Claw hand and claw toes
- Lagophthalmos, nasal septal perforation, collapse of bridge of nose of eyebrows resulting in “leonine” facies

Differential Diagnosis

Sarcoidosis, rheumatoid arthritis, systemic lupus erythematosus, lymphomatoid granulomatosis, carpal tunnel syndrome, cutaneous leishmaniasis, fungal infections and other causes of hypopigmented, hyperpigmented, and erythematous skin lesions.



Diagnosis

A case of leprosy is diagnosed in a person who has one or more of the following cardinal signs and who has yet to complete a full course of treatment:

- Hypopigmented or erythematous skin lesion(s) with definite loss or impairment of sensations
- Involvement of the peripheral nerves, as demonstrated by definite thickening with sensory impairment
- Skin smear positive for acid-fast bacilli

Skin smears are taken from active sites or most commonly from the earlobe, elbows, or knees and are stained for acid-fast bacilli.

- Skin biopsies of active sites are stained for acid-fast bacilli.
- Peripheral nerve biopsy can be done in patients with sensory loss and no skin lesions. Common nerves biopsied are the radial cutaneous nerve of the wrist and the sural nerve of the ankle.

Treatment

Refer to leprosy hospital in Port Au Prince for treatment which lasts between 6 and 24 months depending on type of leprosy

PINTA

(from eMedicine 7/20/2009)

Signs and Symptoms

Physical

- The initial lesion is a papule that slowly enlarges to become a pruritic plaque
- The dorsum of the foot and legs are the most common sites of lesions
- The regional lymph nodes may enlarge.
- Lesions become pigmented with age and may change colors from copper to grey to slate blue

Late lesions become achromic or hyperpigmented.

Causes

- *T. carateum* is the causative agent and is considered to be a separate species from *Treponema pallidum*.
- *T. carateum* can be grown only in primates, and less is known about this treponeme than any of the others.

Differential Diagnoses

- Leprosy
- Syphilis
- Yaws

Treatment

Penicillin G benzathine (Bicillin LA)

Adult: 2.4 million U IM as single dose in 2 injection sites

Pediatric: 50,000 U/kg IM as single dose; not to exceed 2.4 million U

After penicillin therapy, lesions become noninfectious in 24 hours.

Tetracycline (Achromycin, Sumycin)

Alternative to benzathine penicillin for patients who are allergic to penicillin. Treats gram-positive and gram-negative organisms, as well as mycoplasmal, chlamydial, and rickettsial infections.

Adult: 500 mg PO qid for 15 d

Pediatric: <8 years: Not recommended

>8 years: 25-50 mg/kg/d (10-20 mg/lb) PO qid

Erythromycin (Erythrocin, E-Mycin, EES)

Indicated for the treatment of infections in children who are allergic to penicillin or women who are pregnant. In children, age, weight, and severity of infection determine proper dosage. When bid dosing is desired, one half of the total daily dose may be taken q12h. For more severe infections, double the dose.

Adult: 500 mg PO qid pc for 15 d

Pediatric: 30-50 mg/kg/d (15-25 mg/lb/d) PO divided q6-8h pc; double dose for severe infection



CUTANEOUS LARVA MIGRANS

Ancylostoma braziliense (hookworm of wild and domestic dogs and cats)

(From eMedicine 7/21/2009)



Signs and Symptoms

- Tingling/prickling at the site of exposure within 30 minutes of penetration of larvae
- Intense pruritus
- Erythematous, often linear lesions that advance

Signs

- Cutaneous signs include the following:
 - Pruritic, erythematous, edematous papules and/or vesicles
 - Serpiginous (snakelike), slightly elevated, erythematous tunnels that are 2- to 3-mm wide and track 3-4 cm from the penetration site.
 - Nonspecific dermatitis
 - Vesicles with serous fluid
 - Secondary impetiginization
 - Tract advancement of 1-2 cm/d
- Systemic signs include peripheral eosinophilia (Loeffler syndrome), migratory pulmonary infiltrates, and increased immunoglobulin E (IgE) levels, but are rarely seen.
- Lesions are typically distributed on the distal lower extremities, including the dorsa of the feet and the interdigital spaces of the toes, but can also occur in the anogenital region, the buttocks, the hands, and the knees.

Treatment

Thiabendazole (Mintezol) is drug of choice

Apply topical 10-15% susp (sometimes compounded with corticosteroid cream) under occlusive dressing qid for at least 1 wk

Adult and Pediatric: Alternatively, 25-50 mg/kg/d PO divided q12h for 2-5 d
Some drug references, such as *PDR*, suggest 10 mg/lb body weight bid for 2-4 d; treat for 7-10 d in hyperinfection syndrome; not to exceed 3 g/d

Alternative Treatment Choices:

Albendazole

Adult: 400 mg PO qd for 3 d or 200 mg PO bid for 5 d with meals

Pediatric: <2 years: 200 mg/d for 3 d and repeat in 3 wk, if necessary
>2 years: Administer as in adults

Mebendazole

Adult: 200 mg PO bid for 4 d

Pediatric: <2 years: Not established
>2 years: Administer as in adults

Ivermectin

Adult: 12 mg or 200 mcg/kg PO once

Pediatric: <5 years: 150 mcg/kg PO once
>5 years: Administer as in adults

FEVER

Differential Diagnosis (a partial list)
<ul style="list-style-type: none">• Tuberculosis• HIV• Malaria• Dengue• Typhoid• Measles• Typhus• Shigella• Upper Respiratory Infections• Urinary Tract Infections• PID• Pneumonia• Rubella• Mumps• Sepsis• Cancer• Rheumatic fever

DENGUE

(from Dynamed 7/12/09)

Signs, Symptoms, Diagnosis

WHO case definitions developed as tool for epidemiologic surveillance

- dengue fever - clinical description - acute febrile illness lasting 2-7 days
- plus ≥ 2 of:
 - headache
 - retro-orbital pain
 - myalgia
 - arthralgia
 - rash
 - hemorrhagic manifestations
 - leukopenia
- dengue hemorrhagic fever - criteria for probable or confirmed case of dengue and hemorrhagic tendencies
 - thrombocytopenia ($\leq 100,000$ cells/mm³)
 - evidence of plasma leakage due to increased permeability, manifested by ≥ 1 of:
 - 20% rise in average hematocrit for age and sex
 - 20% drop in hematocrit after volume replacement treatment compared to baseline
 - signs of plasma leakage (e.g. pleural effusion, ascites, hypoproteinemia)
 - plus ≥ 1 hemorrhagic manifestation
 - positive tourniquet test (> 20 petechiae in 2.5 x 2.5 cm square patch of skin)(4)
 - petechiae, ecchymoses or purpura
 - bleeding (e.g. from mucosa, gastrointestinal tract, or injection sites)
 - hematemesis or melena
- dengue shock syndrome – criteria include:
 - meets criteria for dengue hemorrhagic fever
 - plus evidence of circulatory failure, symptoms include:
 - rapid and weak pulse
 - narrow pulse pressure (≤ 20 mm Hg)
 - hypotension for age
 - cold, clammy skin
 - altered mental status

Clinical Pearls

- Dengue can be ruled out if symptoms start > 2 weeks after patient leaves area endemic for dengue, or if fever lasts > 2 weeks(4)
- Clinical findings are not helpful in distinguishing dengue fever from other febrile illnesses such as:
 - Measles (rash appears similar)(1)
 - Leptospirosis (PLoS Negl Trop Dis 2007 Dec 26;1(3):e111 full-text)
 - Typhoid
 - Malaria
 - Chikungunya
 - Ebola
 - Fever without localizing signs

Probable Dengue if platelet count $\leq 193,000/\text{mm}^3$, white blood cell count $\leq 6,000/\text{mm}^3$ and temperature > 37.4 degrees C (99 degrees F)

Likely Dengue if any of

- platelet count $\leq 143,000/\text{mm}^3$, white blood cell count $\leq 6,000/\text{mm}^3$ and temperature ≤ 37.4 degrees C (99 degrees F)
- platelet count $\leq 193,000/\text{mm}^3$, white blood cell count $> 6,000/\text{mm}^3$ and hematocrit $\leq 41.2\%$
- platelet count $> 193,000/\text{mm}^3$, lymphocyte count $\leq 580/\text{mm}^3$ and neutrophil count $\leq 4,900/\text{mm}^3$

NOTE: leukopenia and elevated aminotransferase levels may be early markers of dengue in children

Treatment

- * no specific treatment for dengue fever
- * supportive care - rest, fluids, analgesics, antipyretics (use acetaminophen instead of aspirin to avoid impairment of platelet function)
- * hospitalize if risk for shock

Indications for hospital admission due to risk for impending shock(4)

- intense, sustained abdominal pain
- persistent vomiting
- restlessness or lethargy
- sudden change from fever to hypothermia with sweating and prostration
- any suggestion of hypotension
- decreasing platelet count and increasing hematocrit

- * intravenous fluids are primary treatment in severe cases

isotonic crystalloids (Ringer's lactate or normal saline) are preferred fluids for children with moderately severe dengue shock syndrome

TUBERCULOSIS

(from eMedicine 7/25/09)

Background

The case-fatality rate for TB was 50% for untreated patients before the advent of antibiotic therapy. TB-related deaths worldwide are estimated at 3 million per year.

Country Population	9,445,947
Est. number of new TB cases	28,290
Est. TB incidence (all cases per 100,000 pop)	299
DOTS population coverage (%)	91
Rate of new SS+ cases (per 100,000 pop)	133
DOTS case detection rate (new SS+) (%)	55
DOTS treatment success rate, 2005 (new SS+) (%)	81
Est. new adult TB cases (HIV) + (%)	6.8
New multidrug-resistant TB cases (%)	1.9
WHO Global TB Report 2008 and WHO Anti-Tuberculosis Drug Resistance in the World Report, 2008	

Signs and Symptoms

Symptoms

- Pulmonary tuberculosis (TB): Typical symptoms of pulmonary TB include a productive cough, fever, and weight loss. Patients with pulmonary TB occasionally present with hemoptysis or chest pain. Other systemic symptoms include anorexia, fatigue, and night sweats.
- Tuberculous meningitis: present with a *headache* that is either intermittent or persistent for 2-3 weeks. Subtle mental status changes may progress to coma over a period of days to weeks. Fever may be low-grade or absent.
- Skeletal TB: The most common site of skeletal TB involvement is the spine (Pott disease). Symptoms include back pain or stiffness. Lower-extremity paralysis occurs in up to half of patients with undiagnosed Pott disease. Tuberculous arthritis usually involves only one joint. Although any joint may be involved, the hips and knees are affected most commonly, followed by the ankle, elbow, wrist, and shoulder. Pain may precede radiographic changes by weeks to months.
- Genitourinary TB: Reported symptoms of genitourinary TB include flank pain, dysuria, and frequency. In men, genital TB may manifest as epididymitis or a scrotal mass. In women, genital TB may mimic *pelvic inflammatory disease*. TB is the cause of approximately 10% of sterility cases in women worldwide and approximately 1% in industrialized countries.

- Gastrointestinal TB: Any site along the gastrointestinal tract may become infected. Symptoms of gastrointestinal TB are referable to the site infected, including the following: nonhealing ulcers of the mouth or anus; difficulty swallowing with esophageal disease; abdominal pain mimicking *peptic ulcer disease* with stomach or duodenal infection; malabsorption with infection of the small intestine; and pain, diarrhea, or hematochezia with infection of the colon.
- Tuberculous lymphadenitis (scrofula): The most common site of tuberculous lymphadenitis is in the neck along the sternocleidomastoid muscle. It is usually unilateral and causes little or no pain. Advanced cases of tuberculous lymphadenitis may suppurate and form a draining sinus.
- Cutaneous TB: Direct inoculation may result in an ulcer or wartlike lesion. Contiguous spread from an infected lymph node typically results in a draining sinus. Hematogenous spread may result in a reddish brown plaque on the face or extremities (*lupus vulgaris*) or tender nodules or abscesses.

Signs

- Patients with pulmonary TB have abnormal breath sounds, especially over the upper lobes or areas involved.
- Signs of extrapulmonary TB differ depending on the tissues involved. Signs may include confusion, coma, neurologic deficit, chorioretinitis, lymphadenopathy, and cutaneous lesions (see History).

Postnatal TB is contracted via the airborne route. The most common findings of postnatal TB include adenopathy and a lung infiltrate. However, the chest radiographic findings may be normal in infants with disseminated disease. Many experts increase the treatment duration to 9 or 12 months because of the possible impaired immune system in children younger than 12 months.

Diagnosis

- **PPD**

Larger than or equal to 5 mm

- Close contacts to persons with newly diagnosed TB
- Persons with HIV infection
- Patients with organ transplant or patients who are taking the equivalent of more than 15 mg/d of prednisone for one month or more
- Patients with fibrotic lesions on chest radiography (not granulomas)

Larger than or equal to 10 mm

- Patients with medical conditions that increase the risk of TB (eg, diabetes mellitus, hematologic malignancies, carcinoma of the head and neck, intravenous drug use [known to be HIV-negative], end-stage renal disease, silicosis, malnutrition, jejunioileal bypass, gastrectomy)

- Recent converter - At least 10-mm increase in skin test in past 2 years (regardless of age)
- Recent immigrants (within 5 y) from a high-prevalence country
- Children younger than 4 years exposed to adults at high risk for TB
- Residents and employees of facilities for long-term care, including correctional institutions, nursing homes, homeless shelters, and mental institutions

Larger than or equal to 15 mm - Persons with none of the above

- **Microscopy:** Smear sputum for presence of Acid Fast bacilli (see appendix for picture and instructions on how to do this)
- **Radiology:** CXR can be done to look for cavitary lesions

Treatment

Refer to TB treatment program for DOTS (direct observed therapy), provide education on decreasing transmission (mask/covering mouth when coughing)

TB treatment Centers in Haiti:

- TB treatment : Government Health Centers
- Sanatorium in PAP
- Croix des Misssions
- Grace Children's Hospital
- St. Catherines*
- Shapi*
- Sante pour le Developpement et la Stabilite d'Haiti Project (treats coinfectd TB/HIV patients)
- PNLT (Programme National de Lutte contre la Tuberculose) , DOTS is being expanded to 360 health facilities (80% coverage of population) with local treatment available in Leogane.

NOTE about TB in Haiti

Since 1998, the Ministry of Health (MOH) has supported the DOTS strategy in order to strengthen the national TB program, the *Programme National de Lutte contre la Tuberculose* (PNLT), and approved national guidelines and norms for TB control in 2002.

However, the program lacks political and financial support from the government, and there is a lack of skilled technical human resources at the central level of the PNLT. A major problem in combating TB is that co-infection with HIV can run as high as 30 percent in some urban areas.

Conversely, 20 percent of HIV-positive adults in Haiti are infected with TB. Strong

stigma and cultural barriers attached to TB also interfere with case detection and adherence to treatment. Multidrug-resistant (MDR) TB has increased from 1.4 percent in 2004 to 1.9 percent in 2006.

In partnership with three US AID-supported nongovernmental organizations, the MOH has taken steps to implement DOTS clinics in all 10 geographical departments in Haiti.

TYPHOID

(from MDConsult 7/12/09)

Signs and Symptoms

Signs	Symptoms
<ul style="list-style-type: none"> • Onset is usually gradual • High fever • Severe frontal headache • Arthralgias • Abdominal pain and tenderness • Pharyngitis • Constipation • Anorexia • Dysuria • Nonproductive cough • Epistaxis • Malaise 	<ul style="list-style-type: none"> • Prolonged fever, chills, and sweats • Delirium, stupor, or coma in severe cases • Discrete pink, blanching lesions (rose spots) appear in crops on the chest and abdomen during the second week and resolve in 2-5 days (10% of patients) • Relative bradycardia • Cervical adenopathy • Hepatomegaly • Splenomegaly • Leukopenia, leukocytosis in children • Anemia, thrombocytopenia • Liver function abnormalities • Proteinuria • Mild consumption coagulopathy • Acute cholecystitis and hepatitis • Florid diarrhea late in disease (stool may contain blood - 20% occult, 10% gross), or constipation • Severe bleeding occurs during third week with mortality rate of approx. 25% (2% of patients) • Pneumonia may develop during

	<p>second or third week, usually due to pneumococcal infection</p> <ul style="list-style-type: none"> • Pneumonitis, fever only, or urinary tract infection symptoms may delay diagnosis • Symptoms and signs of initial clinical syndrome may recur approx. 2 weeks after defervescence
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Different than typhus fever which is Rickettsial; caused by *Salmonella typhi*

Differential Diagnosis

- Malaria
- Disseminated tuberculosis
- Nontyphoidal salmonella poisoning
- Brucellosis
- Hepatitis A
- Influenza
- Visceral leishmaniasis
- Rickettsioses

Treatment

Goals

- To **treat with third-generation cephalosporin as soon as possible**
- In serious cases, to provide supportive care that is essential to recovery
- In less serious cases that do not require hospitalization, to ensure good home care, which is essential to aid recovery
- To instruct on self-care during convalescent state
- To report carriers to local health department and to prohibit them from handling food. Typhoid bacilli may be isolated for as long as 3-6 months after acute illness; thereafter, three negative stool cultures at weekly intervals must be acquired to exclude a carrier state

Immediate action

- **Hospitalize in all but the mildest of cases**
- **Examine patient to assess for possible complications**
- **Arrange for immediate diagnostic tests so that antibiotic therapy can begin as soon as possible**

Antibiotic Therapy

- Ciprofloxacin is the drug of choice for uncomplicated adult cases
- Ceftriaxone is used in cases where patients do not respond to ciprofloxacin or where parenteral therapy is desired to ensure delivery

of therapy

- Azithromycin is suitable for children with uncomplicated typhoid fever
- Severely ill patients warrant parenteral ciprofloxacin or ceftriaxone
- Outpatient treatment can be accomplished with ciprofloxacin or other fluoroquinolone. Second-line oral drugs include *cefixime* or *azithromycin*
- Antibiotic therapy during initial illness increases incidence of febrile relapse to 15-20%. If antibiotic therapy is reinstituted at the time of relapse, fever abates rapidly, unlike the slow defervescence seen during primary illness
- Antibiotic resistance is a growing problem. Multidrug-resistant strains of *Salmonella typhi* are particularly common in India. Ampicillin, trimethoprim-sulfamethoxazole, and chloramphenicol are no longer reliable first-line agents for treatment; resistance to fluoroquinolones is increasing
- For carriers with normal biliary tracts, ampicillin or amoxicillin is recommended. Probenecid may be given with ampicillin but only when organism is known to be sensitive
- In endemic countries prednisone or dexamethasone may be used in addition to antibiotics to treat severe toxicity. Prednisone for the first 3 days of treatment usually suffices. Higher doses of glucocorticoids are used in patients with marked delirium, coma, or shock
- Broader Gram-negative and anaerobic antibiotics in cases of intestinal perforation and associated peritonitis

Supportive Care

- Restoring nutrition: clear liquid diet and possibly parenteral nutrition to restore nutrition and minimize diarrhea
- Fluid and electrolyte therapy and blood replacement may be needed
- Home care - isolate patient and get him/her to use bedside commodes or a separate bathroom
- Caregivers must wash hands carefully and often

Surgical Intervention Plus Antibiotics

- Surgery is needed only rarely to repair intestinal perforation
- Cholecystectomy, preceded and followed by antibiotics (ampicillin), is indicated for carriers with gallstones who remained uncured by antibiotic therapies

(continued on next page)

Clinical Pearls

* Start antibiotics, even without a definite laboratory confirmation, if high index of suspicion in a severely ill patient

* Use steroids along with appropriate antimicrobial agents if patient is in shock or has altered mental status; this is one of the few situations where glucocorticoids have been shown to provide a survival advantage in Gram-negative bacterial sepsis

* HIV patients will need prolonged (5-6 weeks) antibiotic treatment to prevent relapse; some will need extended antimicrobial agents if immune reconstitution with highly active antiretroviral therapy (HAART) is not accomplished

* Never administer salicylates, which may cause hypothermia, gastrointestinal irritation, and hypotension in patients with typhoid fever

* Never administer laxatives or enemas to patients with typhoid fever

CHICKEN POX (VARICELLA)

(from eMedicine 7/29/2009)

Background

- *Varicella zoster virus* causes the infection.
- Symptoms tend to be milder in younger ages and risk of complications increase proportionately to the age of the patient.
- The usual incubation period is 10-21 days. The patient is contagious from 1-2 days before the appearance of rash until the lesions crust over, usually 5-6 days after the rash first appears.
- Varicella is most commonly observed in children aged 3-6 years
- The case-fatality rate in the general population is 6.7 case per 100,000.

Signs and Symptoms

Signs and Symptoms	Complications
<p>Skin:</p> <ul style="list-style-type: none"> • Lesions begin as red macules -> popular -> vesicular -> pustular -> crusted • Vesicles “dew drops on rose petals” • Lesions in multiple stages • Typically starts on face or trunk • Vesicles can be hemorrhagic <p>Fever up to 39.5 C for 3-6 days</p> <p>Pneumonitis</p> <p>Meningo-encephalitis</p> <p>Cerebellitis (ataxia)</p> <p>Tachypnea</p> <p>RUQ pain/tenderness w/ or w/o jaundice</p>	<ul style="list-style-type: none"> • Skin superinfection • Scarring • Neurologic complications: Reye syndrome, acute cerebellar ataxia, <u>encephalitis</u>, <u>meningoencephalitis</u>, polyradiculitis, and myelitis (including <u>Guillain-Barré syndrome</u>). • Other rare complications: <u>myocarditis</u>, glomerulonephritis, appendicitis, pancreatitis, <u>Henoch-Schönlein purpura</u>, orchitis, arthritis, osteomyelitis, optic neuritis, iritis, and keratitis. • Varicella pneumonia is a complication usually of adult varicella and occurs in 1:400 cases. • Immunocompromised children with varicella are at high risk for developing progressive varicella with multiple organ involvement.

Special Populations

- In pregnant women, varicella during the first 20 weeks of gestation can lead to multiple congenital anomalies including limb atrophy, neurologic and ocular abnormalities, as well as growth retardation.
- Infants born to women who have varicella 5 days or fewer before delivery or 2 days postpartum may develop disseminated varicella neonatorum. Hemorrhagic lesions of the liver and lungs characterize this potentially fatal disease.

For susceptible individuals (see below) passive immunization with VZIG is effective against varicella if given within 96 hours of exposure.

- Immunocompromised children
- Susceptible pregnant women
- Newborns whose mothers had varicella within 5 days prior to delivery or within 48 hours after delivery

Treatment

Supportive: Benadryl, Atarax, Tylenol

For pneumonitis/encephalitis or other severe complications:

Acyclovir: either PO or IV depending on status of patient

Adult: 600-800mg 5x/d for 5 d

Peds: 80mg/kg/d po divided qid for 5 d

DO NOT treat fever with aspirin this can cause Reyes Syndrome

Patient Education

Families should be instructed to seek medical care if any of the following occur:

- The blisters look infected.
- A change in the child's behavior occurs.
- Blisters are observed in the child's eyes.
- The child has trouble breathing.
- The child has a severe headache or has trouble walking.
- The fever persists after the third day, or the fever was gone and then came back.

Children with chickenpox should avoid nonimmune pregnant women, unimmunized young infants, and others with immunodeficiencies or who are taking prednisone long term.

Children with chickenpox may not return to school or day care until all lesions are crusted over

TYPHUS¹

Background

- Typhus is an acute febrile illness caused by rickettsial organisms. Rickettsia are pleomorphic bacteria that may appear as cocci or bacilli and are obligate intracellular parasites.
- The duration of most clinical symptoms and signs in untreated typhus is approximately 2 weeks. Several months may pass before complete recovery from fatigue and malaise.

- Typhus is a multisystem vasculitis and may cause a wide array of clinical manifestations.

Signs and Symptoms

Symptoms

- Fever is characterized by abrupt onset.
- Headache is characterized by abrupt onset and is unremitting.
- A maculopapular/petechial rash occurs on days 4-7 and may begin on the axilla and trunk and spread peripherally.
- Rigors, myalgias, malaise, and CNS symptoms (ranging from mental dullness to coma).

Signs

Fever

- Fever rises to 39-41°C and is persistent in patients with untreated typhus.
- Patients with typhus have relative bradycardia with the fever.
- Fever may persist for 24-72 hours after initiation of antibiotic therapy.

Tachypnea and cough

This is most common in scrub typhus because of frequent pulmonary involvement.

Rash

- The macular, maculopapular, or petechial rash initially occurs on the trunk and axilla and spreads to involve the rest of the body except for the face, palms, and soles.
- Rash may be petechial in patients with epidemic or murine typhus.

Regional lymphadenopathy

- This occurs in scrub typhus in the region of the arthropod bite and inoculation. Generalized lymphadenopathy may follow.
- Lymph nodes are often tender and enlarged.

Generalized lymphadenopathy

Eschar

- This is found in the scrub form of typhus and is essential in confirming a clinical diagnosis.
- It occurs in up to 60% of cases.
- Eschar occurs at the site of the arthropod bite.
- It starts as a painless papule, and the lesion becomes indurated and enlarged.
- The center of the lesion becomes necrotic and develops into a black scab.

Other features

- Mild splenomegaly may occur.
- Mild hepatomegaly may occur.
- Conjunctival suffusion may occur in scrub typhus.

Treatment

Doxycycline

Adult: 200 mg PO/IV bid for 3 d, then maintenance dose 100 mg PO/IV bid

Pediatric: ≥8 years: administer Doxycycline as in adults

<8 years: Azithromycin 10 mg/kg PO (max 500 mg) on day 1;
then 5 mg/Kg PO (max 250 mg) on days 2-5

Chloramphenicol

Adult: 0.5-1 g IV q6h; not to exceed 4 g/d

Pediatric: 80-100 mg/kg/d IV divided q6h

MEASLES⁶

Signs and Symptoms

Symptoms	Signs
<p>Prodromal phase (2-4 days' duration):</p> <ul style="list-style-type: none">• Fever• Malaise• Coryza• Conjunctivitis• Cough <p>Exanthem phase:</p> <ul style="list-style-type: none">• Fever• Cough• Malaise• Rash	<p><u>Prodromal phase</u> (2-4 days' duration):</p> <ul style="list-style-type: none">• Fever, conjunctival injection• Koplik's spots (pathognomonic of measles - usually noted opposite the second molars and characterized as bluish-white lesions on an erythematous base) <p>Exanthem phase:</p> <ul style="list-style-type: none">• Erythematous maculopapular rash, which blanches, starting at the hairline and spreading to the forehead, face, neck, trunk, and extremities, including the palms and soles. During the healing phase, involved areas may desquamate except for the palms• Fever• Sometimes the characteristic rash does not develop in immunocompromised individuals

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Incubation period is generally 8-12 days from exposure to onset of symptoms.

Differential Diagnosis

- Scarlet fever
- Drug rash
- Rubella
- Roseola
- Erythema infectiosum
- Kawasaki disease
- Toxic shock syndrome
- Typhoid

The clinical case definition requires that all of the following be present:

- A generalized rash lasting at least 3 days
- A temperature of at least 101°F (38°C)
- Cough, coryza, or conjunctivitis

Treatment

Fluids, rest, and supportive care are the most appropriate treatment for most nonimmunocompromised patients

- Supportive treatment is often all that is required. Presently, there is no specific antiviral therapy available specifically for the treatment of measles
- *Vitamin A* can be used in children with evidence of poor nutrition, with severe measles, or who are otherwise at risk of complications

Dose of 200,000 international units of vitamin A given for 2 days is associated with a reduced risk of overall mortality rate. A 66% reduction in mortality and morbidity can be seen with supplementation.

Vitamin A: 200,000 IU po for 2 days

* The World Health Organization (WHO) and the United Nations International Children's Emergency Fund (UNICEF) recommend that vitamin A be given to all children diagnosed with measles in all regions known to have problems with vitamin A deficiency and where the mortality rate associated with measles and its complications is known to be 1% or greater

It has been recommended that during measles outbreaks all susceptible individuals need to be vaccinated. Measles virus vaccine given within 72h of exposure can prevent disease



Clinical Complications

- Complications are more likely in patients <5 or >20 years of age
- The most common complications are diarrhea, otitis media, bronchopneumonia, and croup (laryngotracheobronchitis) (more commonly seen in young children)
- Pneumonia (either viral or superimposed bacterial) is the most common serious complication and is responsible for most measles deaths (in 1-3 of every 1000 cases)
- Encephalitis, although rare, is also responsible for a substantial proportion of measles deaths and may cause permanent neurologic sequelae (occurs in approx. 1 of every 1000 cases)
- Subacute sclerosing panencephalitis can occur as a complication of measles many years after the acute episode, but is now extremely rare in the US. (Of the 84 reported cases between 1978-83, the mean incubation period was 10.8 years)
- Complications in developing countries are more common and more likely to be fatal

MALARIA - PLASMODIUM FALCIPARUM⁶

Background

- 100% of population at risk (all areas of the country have malaria cases)

- Haiti indicated that since the National Malaria Eradication Service was closed in 1988, the malaria control program has not been integrated in general health services due to a lack of human and financial resources. Nonetheless, diagnosis and treatment are carried out in health centers.
- Risk is present countrywide year-round at elevations under 500 meters. Peak transmission occurs from September through January, with a secondary peak from April through June. Malaria risk—exclusively due to *P. falciparum*—exists throughout the year in certain forest areas in Chantal, Gros Morne, Hinche, Jacmel and Maissade. There is increased risk of malaria in the northern coastal areas. In the other cantons, risk is estimated to be low. *Falciparum* malaria accounts for 99%–100% of cases
- 9,837 positive blood slides for malaria in Haiti in 2001 (from STATUS REPORT ON MALARIA PROGRAMS IN THE AMERICAS (Based on 2001 data) PAHO/HCP/HCT/M217/02)

Signs and Symptoms

Symptoms	Signs
<ul style="list-style-type: none"> • Fever • Shaking chills • Fatigue • Malaise • Headache • Liver tenderness • Nausea/anorexia/vomiting • Abdominal pain • Myalgias/arthralgias • Depression 	<ul style="list-style-type: none"> • Fever • Anemia with reticulocytosis • Thrombocytopenia • Jaundice • Diaphoresis • Splenomegaly in chronic infection and occasionally hepatomegaly • Seizures, focal neurologic deficits, coma • Pulmonary edema • Uremia • Cardiogenic shock with hypotension • Vomiting • Bloody diarrhea • * Nephrotic syndrome

Differential Diagnosis

- Babesiosis
- Typhoid Fever
- Influenza
- Dengue hemorrhagic fever
- Miliary tuberculosis
- Meningitis
- Leishmaniasis
- Hepatitis
- Gastroenteritis

WHO Criteria for Clinical Diagnosis of Malaria

- In general, in settings where the risk of malaria is low, clinical diagnosis of uncomplicated malaria should be based on the degree of exposure to malaria and a history of fever in the previous 3 days with no features of other severe diseases.
- In settings where the risk of malaria is high, clinical diagnosis should be based on a history of fever in the previous 24 h and/or the presence of anemia, for which pallor of the palms appears to be the most reliable sign in young children.

Diagnosis by Test (see appendix)

- Thin blood smear
- Thick blood smear
- Rapid diagnostic tests

Treatment

Resistance strains are starting to be seen in Haiti, patients who do not respond to Chloroquine or are otherwise at risk, may need to be treated for Chloroquine-resistant P. falciparum. See appendix for full treatment guidelines.

Chloroquine (Malaria seen in Haiti is Chloroquine-sensitive)

Dose conversion: 300mg base = 500mg salt

Adult: Oral - 600mg immediately; followed by 300mg at 6h, 24h, and 48h

* Total dose: 1500mg

* Dose refers to chloroquine base

Pediatric: Oral - 10mg/kg/dose immediately; followed by 5mg/kg/dose at 6h, 24h, and 48h

* Total dose: 25mg/kg

* Dose refers to chloroquine base

- For pregnant women diagnosed with uncomplicated malaria caused by P. malariae, P. vivax, P. ovale, or chloroquine-sensitive P. falciparum infection, prompt treatment with chloroquine is recommended [2]Level C
- In pregnant women all chloroquine-resistant infections should be treated with quinine sulfate. In P. falciparum infection quinine sulfate should be given in combination with clindamycin [2]Level C
- Compatible with lactation; amount of chloroquine excreted into milk is insufficient to provide adequate protection against malaria

Children <8 years and pregnant women, with malaria, should not be treated with doxycycline

Severe Malaria

International consensus recommends quinine for the treatment of severe falciparum malaria

Clinical Pearls

- Falciparum malaria with >5% parasitemia in a nonimmune person constitutes a medical emergency. Urgent treatment is indicated and necessitates expert treatment and follow-up
- 'Tropical splenomegaly' (large spleen, anemia, hypoalbuminemia, increased blood volume, weakness, fatigue) is usually caused by *P. vivax*. Treatment will improve the clinical process, but weeks or months may be necessary to see improvement

MUMPS⁶

Background

The incubation period is 14-21 days, and mumps is communicable from 6 days before to 9 days after facial swelling is apparent. However, 30% of infections are subclinical.

Death due to mumps is rare; more than half of the fatalities occur in persons older than 19 years.

Symptoms

- Fever
- Headache
- Anorexia
- Abdominal pain
- Malaise
- Pain with chewing
- Parotid enlargement (unilateral or bilateral)
- Pain/swelling of testes

Signs

After the prodromal period, one or both parotid glands begin to enlarge; 70-80% of cases are bilateral. Edema over the parotid gland typically occurs with nondiscrete borders, pain with pressure, and obscured angle of the mandible.

- *Parotitis*: The classic illness of mumps consists of swelling of the parotid gland (ie, parotitis, parotiditis). Acid-containing foods may aggravate discomfort of the parotid gland. Unilateral, followed by bilateral parotid involvement is most common.
- *Orchitis*: 1/3rd unilateral orchitis. sterility is rare even with bilateral involvement. Orchitis is accompanied by high fever, severe pain, and swelling. Nausea, vomiting, and abdominal pain are not uncommon. Fever and gonadal swelling usually resolve in 1 week, but tenderness may persist.
- *Meningoencephalitis*: meningitis more common than true encephalitis. Headache, fever, nausea, vomiting, and meningismus are common. It is usually associated with an uneventful recovery.
- *Deafness*: Neuritis of the auditory nerve may result in deafness. Sudden onset of tinnitus, ataxia, and vomiting is followed by permanent deafness. Other neurologic complications include facial nerve neuritis and myelitis.
- *Other complications*: Less common complications include arthritis, myocarditis, pancreatitis, thyroiditis, oophoritis, mastitis, and hematologic complications.

Differential Diagnosis

- Human Immunodeficiency Virus Infection
- Coxsackievirus parotitis
- Influenza virus parotitis
- Parainfluenza virus parotitis
- Suppurative parotitis commonly caused by *Staphylococcus aureus* or other bacteria
- Adenitis
- Recurrent parotitis
- Calculus of Stensen duct
- Tumors of the parotid gland
- Mikulicz syndrome
- Meningoencephalitis

Diagnosis

Clinical - lab tests are not necessary

Treatment

- Conservative therapy is indicated.
- Generous offering of fluids is essential because adequate hydration and alimentation of patients is important.
- Foods and liquids that contain acid may cause swallowing difficulty as well as gastric irritation.
- Prescribe analgesics for severe headaches or discomfort due to parotitis. In orchitis, stronger analgesics may be needed.
- No antiviral agent is indicated for mumps, which is a self-limited disease.

RUBELLA¹

Signs and Symptoms

Symptoms of acute infection	Congenital Rubella Syndrome
<ul style="list-style-type: none">• Fever• Sore throat• Rash – maculapapular rash spreads from face down to neck and trunk• Generalized tender lymphadenopathy• Arthralgias/arthritis - rare	<ul style="list-style-type: none">• Happens when mother infected in 1st trimester• Cataracts, retinopathy• Sensineural deafness• Mental retardation, behavioral disorders• Organ involvement: hepatitis, splenomegaly, pneumonitis, myocarditis, osteomyelitis• Thrombocytopenia• Purple macules & papules from extramedullary hematopoiesis (“Blueberry Muffin baby”)

Rarely does infection result in complication unless infection is in a pregnant woman



Blueberry muffin lesions



generalized rash

Treatment

- Only treatment for acute disease is symptomatic relief as needed
- CRS complications are managed as needed.

Prevention

Immunization to prevent Congenital Rubella Syndrome is recommended only in countries where a high immunization rate can be achieved.

RHEUMATIC FEVER¹

Background

- Develops 1-5 weeks after onset with GABHS (Group A Beta – hemolytic strep or scarlet fever)
- Strep Throat Infection: 3-5 days of sore throat, fever, malaise, headache, elevated WBC
- High rate of recurrence within 5 years of initial episode

Signs and Symptoms

Symptoms	Jones Criteria: need 2 major or 1major and 2 minor
<ul style="list-style-type: none"> • Fever • Rash • Headache • Weight Loss • Epistaxis • Fatigue • Diaphoresis • Pallor • Malaise • Chest Pain, may have orthopnea • Abdominal pain with emesis • Migratory Joint Pain/Polyarthritis • Nodules under the skin • Motor dysfunction (chorea) • PANDA syndrome (irritability, decreased attention span, personality changes) 	<p>Major diagnostic criteria</p> <p>Carditis (50%)</p> <ul style="list-style-type: none"> • Polyarthritis (70-75%) • Chorea • Subcutaneous nodules • Erythema marginatum <p>Minor diagnostic criteria</p> <ul style="list-style-type: none"> • Fever • Arthralgia • Prolonged PR interval on electrocardiography • Elevated acute-phase reactants (APRs), which are erythrocyte sedimentation rate and C-reactive protein

Three notable exceptions to strict adherence to the Jones criteria

1. Chorea: It may occur late and be the only manifestation of rheumatic fever.
2. Indolent carditis: Patients presenting late to medical attention months after the onset of rheumatic fever may have insufficient support to fulfill the criteria.
3. Newly ill patients with a history of rheumatic fever, especially rheumatic heart disease (RHD), who have supporting evidence of a recent group A strep (GAS) infection and who manifest either a single major or several minor criteria: Distinguishing recurrent carditis from preexisting significant RHD may be impossible.

Laboratory

Evidence of previous GAS pharyngitis (One of the following must be present):

- Positive throat culture or rapid streptococcal antigen test
- Elevated or rising streptococcal antibody titer

Can confirm strep infection through titers and throat culture

- EKG to look at cardiac involvement
- CXR can also be done to look at size of heart and for signs of rheumatic pneumonia or CHF

Treatment

Antibiotics if infection still present (throat) :

Amoxicillin

Adult: 500 mg bid 12 hrs or 250 mg tid 8 hrs

Erythromycin for patients who are allergic to penicillins

Adult: 250 mg erythromycin stearate/base (or 400 mg ethylsuccinate) q6h PO 1 h ac for 10 d

Pediatric: Base, estolate, or stearate salts: 20-40 mg/kg/d PO divided bid/qid for 10 d; not to exceed 1 g/d Ethylsuccinate salt: 40 mg/kg/d PO divided bid/qid for 10 d

Anti-inflammatory

Aspirin

Begin administration immediately after diagnosis of RF. Initiation of therapy may mask manifestations of disease. If rapid improvement is not observed after 24-36 hours of therapy, question the diagnosis of rheumatic fever.

Adult: 4-8 g/d PO divided q4-6h; maintain aspirin levels in 20-25 mg/dL range until all symptoms have resolved and APRs have returned to normal

Pediatric: 80-100 mg/kg/d PO divided q4-6h; maintain aspirin levels in 20-25 mg/dL range until all symptoms have resolved and APRs have returned to normal

Prednisone

Indicated for cardiomegaly, CHF, 3rd degree heart block, use it for 2-4 weeks depending on severity

Adult: 2 mg/kg/d PO for 2-4 wk

Pediatric: Administer as in adults

COUGH

Reference 10

Differential Diagnosis (partial list)

Pulmonary Causes	Infective Causes
<ul style="list-style-type: none"> • Smoking • Pneumonia • Asthma • Reflux • Bronchitis • Lung cancer • Drugs (ACE-I) • TB • COPD • Pulmonary edema 	<ul style="list-style-type: none"> • Typhoid • P. falciparum malaria • Measles • Bronchiectasis • Amoebic liver abcess • Pulmonary hydatid disease • AIDS • Rickettsial infections • Paragonimiasis(parasitic disease) • Tropical pulmonary eosinophilia • Plague • Loffler's syndrome • Upper Respiratory Infection
Hemoptysis	Other rare causes for Hemoptysis
<p>Acute: Pneumonia</p> <ul style="list-style-type: none"> • Bronchitis • PE • Hemorrhagic fevers <p>Chronic:</p> <ul style="list-style-type: none"> • TB • Lung cancer • Bronchiectasis 	<ul style="list-style-type: none"> • Fungal disease • Contusion • Foreign Body • Vasculitits • Hemosiderosis • CF • Mitral stenosis • Aortic aneurysm • DIC • Sepsis • Viper Bites

RESPIRATORY INFECTIONS¹⁰⁻¹¹

Acute Respiratory Infections/Pneumonia
1. Viral respiratory infections: Measles, influenza, rhinovirus, coronavirus, parainfluenza, adenovirus, RSV
2. Throat infections: Streptococcus pyogenes, Corynebacterium diphtheria, Neisseria gonorrhoea, Secondary syphilis, EBV, HSV, Vincent's angina
3. Bronchitis: usually viral but superinfection with <i>H. influenza</i> or <i>S. pneumonia</i> common
4. Pneumonia: <ul style="list-style-type: none"> • Community-acquired pneumonia • Atypical pneumonia • Pneumococcal pneumonia • Nosocomial pneumonia • Aspiration pneumonia • Recurrent pneumonia
5. Other ARI(URI): otitis media, sinusitis

PNEUMONIA

Background

Community Acquired Pneumonia	Clinically based treatment of CAP ADSA/ATS Guidelines 2007
<p>Common bacterial causes of CAP:</p> <ul style="list-style-type: none"> • Streptococcus pneumonia – sudden onset of tachypnea, fever and cough, can have chest pain • Haemophilus influenza type B – often has infection in other location as well: meningitis/epiglottitis, usually in <5 year olds, slower onset 	<p>Antibiotic choice the same regardless of severity other than switching to IV if needed</p> <p><i>Low level of resistance:</i></p> <ul style="list-style-type: none"> • 1st choice - <u>macrolide</u> (azithromycin, clarithromycin, erythromycin) • 2nd choice – <u>doxycycline</u>

<ul style="list-style-type: none"> Staphylococcus aureus – often following viral respiratory infection 	<p><i>Resistance or Comorbid condition:</i></p> <ul style="list-style-type: none"> 1st choice – respiratory <u>fluoroquinolone (moxifloxacin, levofloxacin, or gemifloxacin)</u> 2nd choice – <u>B-lactam + macrolide</u> (high dose <u>amoxicillin or augmentin</u> is preferred; alternatives included <u>ceftriaxone, cefpodoxime, and cefuroxime</u>)
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The following table is a guide to using:

Clinical assessment to diagnose pneumonia in the absence of skilled clinician/lab/radiology. The criteria can be used to help guide diagnosis thought will need to adjust as needed based on skilled clinical exam (ascultation, etc).

Diarrheal Diseases

Reference 10

Acute Diarrhea with Blood	Acute Diarrhea without Blood
<ul style="list-style-type: none"> • Bacillary dysentery (shigellosis) • <i>Balantidium coli</i> enterocolitis • <i>Campylobacter</i> enterocolitis • Enterohemorrhagic <i>E. coli</i> • <i>Yersinia</i> enterocolitis • Amoebic dysentery • <i>Salmonella</i> enterocolitis • Massive <i>Trichuris</i> infection • Antibiotic-associated colitis (psuedomembranous colitis) • <i>S. mansoni</i> or <i>S. japonicum</i> infection (not in Haiti) 	<ul style="list-style-type: none"> • Almost any infection in child/neonate • Rotavirus • Malaria (especially <i>P. falciparum</i>) • Mild shigellosis, <i>salmonella</i> enterocolitis or <i>Campylobacter</i> infections • Enterotoxigenic <i>E.coli</i> (traveler's diarrhea) • Enterotoxin-producing <i>Staphylococcus aureus</i> • Giardiasis • Cholera • Food Poisoning by <i>Clostridium spp.</i> • Cryptosporidiosis • Strongyloidiasis • Food toxins
Chronic Diarrhea	Key History
<ul style="list-style-type: none"> • Subclinical malabsorption • Hypolactasia (1° or 2°) • Tropical sprue • Strongyloidiasis • HIV enteropathy • Enteropathogenic <i>E.coli</i> • Chronic calcific pancreatitis • Intestinal flukes • Chronic intestinal schistosomiasis • Short bowel disease • Lymphoma – Burkitt's & Mediterranean • Iliocecal TB • Acute and Chronic liver disease • Inflammatory bowel disease and celiac disease 	<ul style="list-style-type: none"> • How long has the diarrhea been present? • Is (or was) there fever? • What is the stool like (blood – bright red or dark, and/or mucous)? • How frequent are the motions? • Is there any abdominal pain – where? • Is there a sense of tenesmus (incomplete emptying after defecating)? • Has the patient vomited – how much, when, what? • Has the patient had contact with anyone with similar symptoms? • Have they eaten or drunk anything unusual prior to the onset of symptoms? • Is anyone else in the family ill?

Treatment

Diarrheal Management

A. Rehydration is the main stay of treatment for all causes of diarrhea. Oral rehydration should be done when the patient is able to tolerate it

B. Antimicrobials should be used for:

- Bloody diarrhea (dysentery) which does not improve after 3 days of rehydration treatment. If specific cause is known than tailored antimicrobials should be used if not the first choice should be effective against *Shigella*.
- Cholera with severe dehydration.
- Laboratory-proven, symptomatic cases of *Giardia intestinalis*

C. Consider Vitamin A and Zinc supplementation for children at high risk of deficiency with diarrhea.

SHIGELLOSIS

(from eMedicine 7/21/2009)

Background

Shigellosis occurs worldwide, and it tends to occur whenever war, natural calamities (eg, earthquakes, floods), or unhygienic living conditions result in overcrowding and poor sanitation. *S boydii* and *S dysenteriae* occur more commonly internationally. Disease from *Shigella* species causes an estimated 1 million deaths and 165 million cases of diarrhea annually worldwide.

Mortality/Morbidity: Infection with *Shigella* species may be associated with extragastrointestinal complications.

- Bacteremia occurs primarily in malnourished children and carries a mortality rate of 20% as a result of renal failure, hemolysis, thrombocytopenia, gastrointestinal hemorrhage, and shock.
- Hemolytic uremic syndrome may complicate infections with *Shigella* species and *Escherichia coli*, and it carries a mortality rate of greater than 50%. Hemolytic uremic syndrome is characterized by acute hemolysis, renal failure, uremia, and disseminated intravascular coagulation.
- Metabolic disturbances: Hyponatremia secondary to syndrome of inappropriate antidiuretic hormone (ADH) secretion may occur.

- Leukemoid reaction: An elevated WBC count of 50,000/mm³ occurs in approximately 4% of patients, mainly in pediatric patients aged 2-10 years.
- Neurologic disease: Seizures, the most common neurologic complication, are always associated with fever and are generalized. They are typically nonrecurring and uncomplicated. Seizures are least common with *S dysenteriae*. The prevalence of seizures is approximately 10% across all ages.
- Encephalopathy with lethargy, confusion, and headache has been noted in up to 40% of children hospitalized with *Shigella* infections.
- Reactive arthritis (also known as Reiter syndrome) may occur.

Shigellosis is most common in children aged 6 months to 5 years

Signs and Symptoms

- Acute bloody diarrhea
- Crampy abdominal pain
- Tenesmus
- Passage of mucus
- Fever (1-3 d after exposure)
- Occasionally vomiting (35% prevalence)
- Self-limited course (3 d to 1 wk and rarely lasts as long as 1 mo)
- Lower abdominal tenderness
- Normal or increased bowel sounds
- Dehydration (occasional)

Causes

- *S sonnei* and *S flexneri* cause 90% of the cases of shigellosis.
- *S dysenteriae* has produced epidemic shigellosis.

Treatment

General supportive care of patients with shigellosis includes the following:

- High fever in children should be treated.
- Narcotic-related antidiarrheals should be avoided.
- For fluid and electrolyte supplementation, oral rehydration solutions are preferable.
- Antibiotic treatment is indicated in most patients.

Antimotility agents should be *avoided*. They have the potential to worsen symptoms and may predispose to toxic dilation of the colon.

Antibiotics:

Ceftriaxone

Adult: Uncomplicated infections: 250 mg IM once; not to exceed 4 g
Severe infections: 1-2 g IV qd, or divided bid; not to exceed 4 g/d
Pediatric - Infants and children: 50 mg/kg/d IV/IM qd (not to exceed 1.5 g/d for 5 d)

Ciprofloxacin

Adult - 500 mg PO bid for 5 d
Pediatric - Not recommended

Septa

Adult – SMX/TMP DS/800 mg/160 mg PO bid for 5 d
Pediatric - >2 months: SMX (200 mg/40 mg)
SMX 40 mg/kg (TMP 8mg/kg) PO divided BID for 5 days or 5 ml per 10 kg

Azithromycin

Adult - Day 1: 500 mg PO, Days 2-5: 250 mg PO qd
Pediatric - <6 *months*: Not established
>6 months: Day 1: 12 mg/kg PO once; not to exceed 500 mg/d
Days 2-5: 6 mg/kg PO qd; not to exceed 250 mg/d

ENTEROHEMORRHAGIC E.COLI (EHEC)

Rare but associated with several outbreaks of inflammatory colitis and HUS.

Treatment

Rehydration and symptomatic relief is usually sufficient

CHOLERA - *VIBRIO CHOLERAE*

(from eMedicine 7/27/09)

Transmitted by fecal oral or contaminated water source

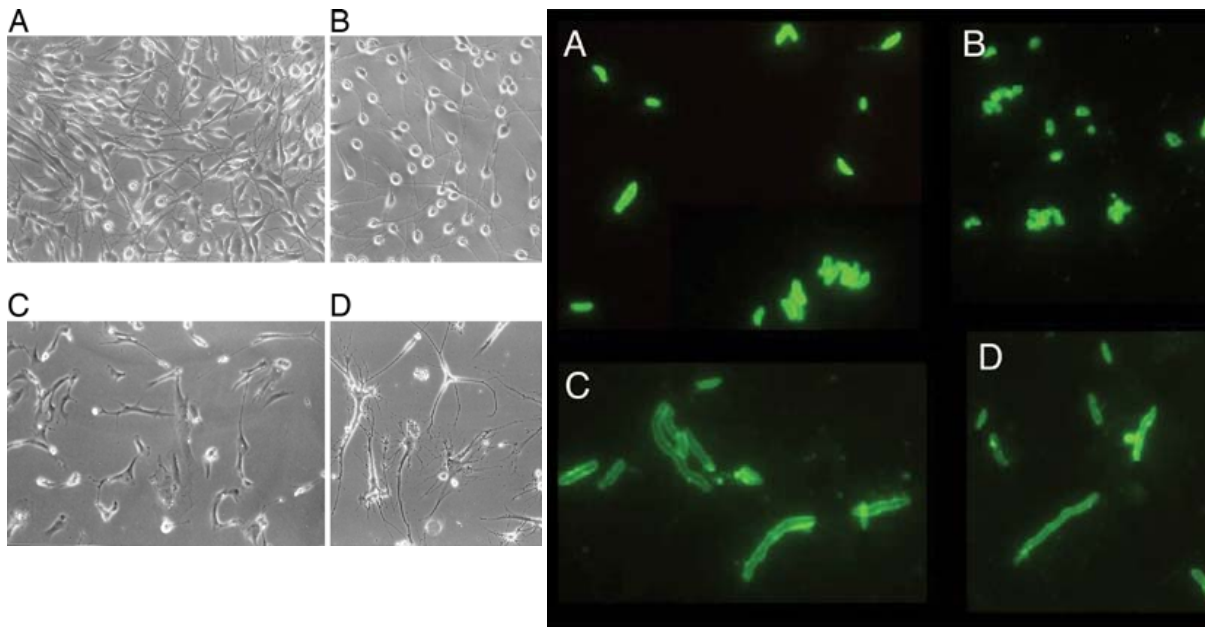
Signs and Symptoms

History and Symptoms	Physical
<ul style="list-style-type: none">• 24- to 48-hour incubation period• sudden onset of painless watery diarrhea<ul style="list-style-type: none">○ “rice water” appearance○ fishy odor○ large volume diarrhea• often followed by vomiting.• accompanying abdominal cramps.• No Fever (children can have fever)• Can have coma and seizures from dehydration	<p>With 3-5% loss of normal body weight:</p> <ul style="list-style-type: none">• Excessive thirst <p>With 5-8% loss of normal body weight :</p> <ul style="list-style-type: none">• Postural hypotension• tachycardia• weakness• fatigue• dry mucous membranes or dry mouth <p>With greater than 10% loss of normal body weight:</p> <ul style="list-style-type: none">• Oliguria• glassy or sunken eyes• sunken fontanelles in infants• weak, thready, or absent pulse• wrinkled "washerwoman" skin• somnolence• coma

In patients with severe disease, the stool volume can exceed 250 mL/kg in the first 24 hours. Without replacement of fluids and electrolytes, hypovolemic shock and death ensue.

Diagnosis

- Usually based on symptoms in endemic areas. Can be confirmed with microscopy.
- The organism may be detected directly with dark-field microscopy examination of a wet mount of fresh stool; chaotic motility is observed. With DFA stain the cholera is easily visible as green.



images from Google Images 7/27/09

The serotype may be determined by immobilization with Inaba-specific or Ogawa-specific antiserum.

Treatment

Rehydration, rehydration, rehydration!

Practical guidelines for the treatment of cholera are as follows:

- Evaluate the degree of dehydration upon arrival.
- Rehydrate the patient in 2 phases. These include rehydration (for 2-4 h) and maintenance (until diarrhea abates).

The goal of the rehydration phase is to restore normal hydration status, which should take no more than 4 hours. Set the rate of infusion in severely dehydrated patients at 50-100 mL/kg/h. Lactated Ringer solution is preferred over isotonic sodium chloride solution because

saline does not correct metabolic acidosis.

The objective of the maintenance phase is to maintain normal hydration status by replacing ongoing losses. The oral route is preferred, and the use of oral rehydration solution (ORS) at a rate of 500-1000 mL/h is recommended.

- Register output and intake volumes on predesigned charts and periodically review these data.
- Only use the intravenous route (1) during the rehydration phase for severely dehydrated patients for whom an infusion rate of 50-100 mL/kg/h is advised, (2) for moderately dehydrated patients who do not tolerate the oral route, and (3) during the maintenance phase in patients considered high stool purgers (ie, >10 mL/kg/h).
- During the maintenance phase, use ORS at a rate of 800-1000 mL/h. Match ongoing losses with ORS administration.
- Discharge patients to the treatment center if oral tolerance is greater than or equal to 1000 mL/h, urine volume is greater than or equal to 40 mL/h, and stool volume is less than or equal to 400 mL/h.

Antibiotics

Azithromycin

Adult 1gm po x 1

Peds <6 mo not established

>6 mo: 20mg/kg Po x1

Tetracycline

Adult 2g po x1

Pediatric <8 yrs: not recommended

>8yrs: not established

Doxycycline

Adult: 250 mg po qday for 3 day or 1 gm x1

Pediatric: not recommended

Erythromycin

Adult: 40mg/kg po divided TID for 3day

Ped: not established

Septra DS

Adult: 160mg TMP/800mg SMZ po bid for 3 days

Pediatric - >2 months: SMX (200 mg/40 mg)

SMX 40 mg/kg (TMP 8mg/kg) PO divided BID for 5 days or 5 ml per 10 kg

Prevention

- Hygiene and sanitation as it is fecal-oral
- Vaccine: there are 3 vaccines currently marketed for cholera

GIARDIA INTESTINALIS¹

Background

- Because of only 10 cysts of organisms may be enough to cause infection
- Most infected individuals are asymptomatic, and most infections are self-limited

Signs and Symptoms

- Diarrhea
- Malaise, weakness
- Abdominal distention
- Flatulence
- Abdominal cramps
- Nausea
- Malodorous, greasy stools
- Anorexia
- Weight loss
- Vomiting
- Low-grade fever (infrequent)
- Various neurologic symptoms (eg, irritability, sleep disorder, mental depression, neuroasthenia)
- Urticaria

The incubation period from the time of ingestion of *G intestinalis* cysts until the onset of symptoms is 1-2 weeks (average, 8 d). Symptoms develop in an estimated 40-80% of infected children.

Diagnosis

- Fresh and persevered stool samples should be examined.
- Motile trophozoites are best identified in a saline wet mount of fresh liquid stool obtained during the acute stages of illness. Trophozoites are not usually found in semifformed stool.
- Cysts are best detected in fresh stools after iodine staining or preservation in 10% buffered formalin or polyvinyl alcohol, with subsequent trichrome or iron hematoxylin staining.

Treatment

Metronidazole (drug of choice)

Adult 250mg po TID for 5 d

Ped: 15mg/kg/d po divided TID for 5 days (not to exceed 750mg)

Tinidazole (drug of choice)

Adult 2g po x1 with food

Ped: <3 yr not established

>3 yr: 50mg/kg PO x1 with food (not to exceed 2 g/dose)

Albendazole

Adult 400mg po qd for 5 d

Ped: 15mg/kg/d po divided bid for 5 d

Furazolidone (Furoxone)

Adult 100mg PO qid for 7-10days

Ped <1 mo not recommended

>1 mo: 5-8.8mg/kg/d po divided qid for 10d (not to exceed 400 mg/day)

Quinacrine (Atabrine)

Adult 100mg po tid for 5-7d

Ped: 7mg/kg/d po divided 3x/day for 5 days (max 300mg/d)

TROPICAL SPRUE¹

- Chronic malabsorptive diarrhea of unclear etiology
- Folate, vitamin B-12, and iron deficiencies are the most common nutrient deficiencies.

Signs and Symptoms

- Diarrhea
- Weight loss
- Leg swelling
- Fatigue
- Fever
- Dehydration
- Pallor

- Oral mucosa changes (glossitis, stomatitis)
- Edema

Diagnosis

Through biopsy in patients with chronic diarrhea and confirmed mal-absorption

Treatment

Useful therapeutic interventions involve antibiotics and replacement of nutrients (eg, folic acid, vitamin B-12, iron), deficient fluid, and sometimes blood.

Combination of antibiotics and folic acid to patients for 3-6 months. Patients with symptoms persisting longer than 6 months may be administered the combination for as long as a year.

Folic acid replacement

Adults 5 mg/d PO/IM/SC

Pediatric: <12 years: Not established; >12 years: 1 mg/d PO/IM/SC

B12 replacement

Adult: 1000 mcg PO/IM; lower doses can be used; 30 mcg/d IM/SC for 5-10 d then 100-200 mcg/mo

Pediatric: 100 mcg IM/SC for 10-15 d then 60-100 mcg/mo IM/SC

Ferrous Sulfate replacement

Adult: 325 mg/d PO

Pediatric: <15 kg: 5 mg/kg/d PO; 15-30 kg: Half of adult dose PO

Tetracycline

Adult: 250 mg PO q6h for 3-6 mo

Pediatric: <8 years: Not recommended; > 8 years: 25-50 mg/d PO divided bid/qid

STOMACH PAIN

Differential Diagnosis

- Hunger
- H.pylori
- Ulcers (not H.pylori)
- Worms
- GERD
- Gastroenteritis
- Constipation
- Acute abdomen (appendicitis, SBO, perforation, etc...)
- Cancer
- Pancreatitis
- UC/Chrohn's
- Esophagitis
- Other

INTESTINAL FLUKES

(from eMedicine 7/27/09)

Uncommon in Haiti

Infection	Source	Geographic distribution
Fasciolopsiasis	Freshwater plants (water caltrop, water chestnut)	China, Thailand, Bangladesh, India
Echinostomiasis	Tadpoles, freshwater snails, fish, frogs	Indonesia, Philippines, Taiwan, Thailand
Heterophyiasis	Fish	Egypt, Iran, Tunisia, Turkey
Metagonimiasis	Fish (cyprinid)	Far East, Spain, Eastern Europe

Signs and Symptoms

Diarrhea, gas, mild abdominal pain, emesis, fever, anorexia are most common

Treatment

praziquantel 20 mg/kg PO q8h for 1 d or abdomendazole

Prevention

Not eating raw or undercooked fish, thoroughly washing contaminated vegetables

STRONGYLOIDIASIS ¹

Background

- Caused by nematode: *Strongyloides stercoralis* and *Strongyloides fuelleborni*
- Larva penetrate skin from infected soil, travel by blood stream to lungs where they ascend and are swallowed to enter the GI tract.

Signs and Symptoms

History/Symptoms	Physical
Acute strongyloidiasis	Acute strongyloidiasis
<ul style="list-style-type: none"> • Lower-extremity itch (eg, mild rash at the site of larval skin penetration, usually on feet) • Cough, dyspnea, wheezing, and low-grade fever (due to larval migration through lungs) • Epigastric discomfort, diarrhea, occasional nausea, and vomiting 	<ul style="list-style-type: none"> • Pruritic erythematous maculopapules at the site of larval skin penetration, usually on the feet • Wheezing • Low-grade fever • Epigastric tenderness
Chronic strongyloidiasis	Chronic strongyloidiasis
<ul style="list-style-type: none"> • Asymptomatic or vague abdominal discomfort (most patients) • Abdominal pain, burning, and cramping (sometimes worse after eating) • Intermittent diarrhea (eg, alternating with <u>constipation</u>) • Occasional nausea and vomiting • Weight loss (if heavier infestation) • Recurrent maculopapular or serpiginous rashes (<u>larva currens</u>) 	<ul style="list-style-type: none"> • Epigastric tenderness • <u>Chronic urticaria</u> • Larva currens ("racing larva") - Rapidly progressive serpiginous wheals beginning perianally and extending to the buttocks, upper thighs, and abdomen at a rate of 5-10 cm/h; pathognomonic lesion of strongyloidiasis possibly due to an external autoinfection (ie, filariform larvae in feces penetrate perianal skin, producing local allergic reaction)
Severe strongyloidiasis	Severe strongyloidiasis
<ul style="list-style-type: none"> • Insidious and occasionally abrupt onset • Nausea, vomiting, and severe abdominal pain • Diarrhea, occasionally bloody • Cough, hemoptysis, dyspnea, and wheezing • Stiff neck, headache, and confusion (if CNS involvement) • Rash 	<ul style="list-style-type: none"> • Diffuse abdominal tenderness; abdominal distension; hyperactive, hypoactive, or absent bowel sounds; vomiting; hematemesis; and hematochezia • Altered mental status and meningismus (if CNS involvement) • Rash (petechiae, purpura) over the trunk and proximal extremities caused by small dermal blood vessel

<ul style="list-style-type: none"> • Fever, chills 	<p>disruption due to massive migration of filariform larvae within the skin</p> <ul style="list-style-type: none"> • Cough, respiratory distress, wheezing, hemoptysis, and crackles • Fever, chills
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Severe strongyloidiasis is uncommon in normal immune function.

Diagnosis



- CBC may show eosinophilia
- Stool for O&P definitive test, often needs to be done for 3 consecutive days to increase sensitivity to 70-80%

Treatment

Ivermectin

Adult: 200 mcg/kg/d PO for 2 d; may repeat course in 14 d

Pediatric: Administer as in adults

Albendazole

Adult: 400 mg/d PO for 3 d; may repeat course in 14-21 d

Pediatric: <2 years: 200 mg/d PO for 3 d; >2 years: Administer as in adults

Thiabendazole

Adult: Acute or chronic strongyloidiasis: 1.5 g PO bid for 2 d

Hyperinfection syndrome or disseminated infection: 1.5 g PO bid for 7-14 d

Pediatric: Acute or chronic strongyloidiasis: 25 mg/kg PO bid for 2 d; not to exceed 3 g/d

Hyperinfection syndrome or disseminated infection: 25 mg/kg PO bid for 7-14 d; not to exceed 3 g/d

HOOKWORM

Background

- Hookworm infections are more common where three conditions coexist:
 - Sanitary practices allow for human fecal contamination of the soil.
 - The soil is appropriately damp to favor larval survival.
 - There is contact of human skin with contaminated soil.
- *Life Cycle*: From the skin, larvae pass to the lungs. At about 8 to 21 days after infection, larvae, like the larvae of *Ascaris*, cross from the pulmonary vasculature, enter the airways, ascend the tracheobronchial tree to the pharynx, and are swallowed. In the small intestine, the larvae mature into adult worms. Adults attach to the mucosa and feed, continually consuming blood and serum proteins. Following fertilization by adult male worms, gravid female adults lay eggs within the bowel. Eggs become detectable in feces about six to eight weeks following infection with *N. americanus*. *Ancylostoma duodenale* larvae may persist within tissues before returning to the intestine; as a result, egg laying can be delayed. Hookworms may be long-lived, lasting for 17 to 18 years in one experimental human infection with *N. americanus*.

Signs and Symptoms

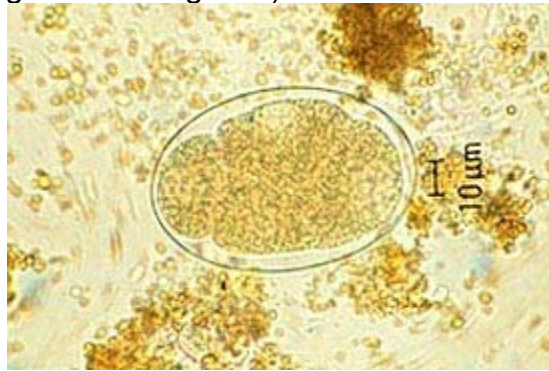
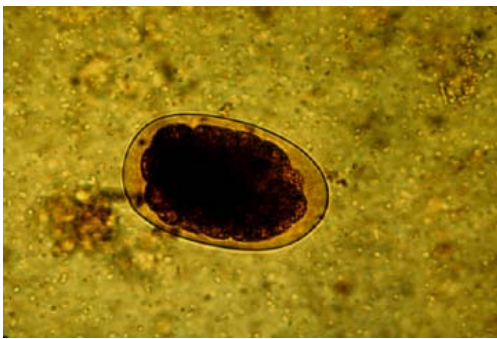
- The potential manifestations reflect the four phases of hookworm infection:
 - Dermal penetration by infecting larvae
 - Transpulmonary passage
 - Acute gastrointestinal symptoms
 - Chronic nutritional impairments
- **Cutaneous manifestations** — Dermal penetration of the skin often produces a focal pruritic maculopapular eruption at each of the sites of larval penetration (so-called "ground itch"). Less often, serpiginous tracks of intracutaneous larval migration can be seen in previously infected subjects; this is to cutaneous larva migrans, which is typically caused by the infective stage larvae of the dog or cat hookworm, *Ancylostoma braziliense*.
- **Transpulmonary passage** — Although larvae penetrate through the lungs from days 8 to 21 after infection, pulmonary symptoms attributable to hookworm have not been experienced by volunteer recipients of experimental infection. Furthermore, bronchoalveolar lavage in four volunteers during this period revealed only erythema of the bronchial mucosa without prominent eosinophilia in lavage fluids. Although a mild cough and pharyngeal irritation may be experienced during the time larvae are migrating in the airways, eosinophilic pulmonary infiltrates typical of *Ascaris* pulmonary involvement are rare.
- **Acute gastrointestinal symptoms** — Infected patients may experience gastrointestinal symptoms at the time when fourth stage larvae and young

adults are returning to the stomach and small intestine. As an example, most recipients of experimental hookworm infections have experienced gastrointestinal symptoms, including nausea, diarrhea, vomiting, abdominal pain (usually midepigastric and often with postprandial accentuation), and increased flatulence. These symptoms have also been noted in individuals with naturally acquired infections.

- **Chronic nutritional impact** — *The major impact of hookworm infection is on the nutritional status of the patient*, the worms consumes about 0.3 ml – 0.5 ml of blood per day, also cause loss of albumin and likely impair digestion and contribute to malnutrition.

Diagnosis

- History of dermal exposure to potentially contaminated soil, by a history of an antecedent hookworm dermatitis, and/or by finding otherwise unexplained blood eosinophilia.
- **Stool examination** for the eggs of *N. americanus* or *A. duodenale* which is not sensitive (can often give false negative)



(hookworm egg-fecal smear wet mount)

Eosinophilia — In appropriate populations (all Haitians), otherwise unexplained eosinophilia may be the major clue to the presence of a parasitic infection. The degree of eosinophilia with hookworm infection is usually mild and varies during the course of the disease.

Treatment

- Albendazole 400 mg PO once
- Mebendazole 100 mg orally BID for three days or 500 mg once
- Pyrantel pamoate 11 mg/kg per day for three days, not to exceed 1 g/day

Notes: Ivermectin, which is effective for many helminthic parasitic infections, is ineffective for hookworm.

Mass treatment campaigns even when only providing temporary relief from infection have been shown to have positive effects on growth, exercise, and cognitive function of affected children and adults

ENTEROBIUS “PIN WORM”

Background

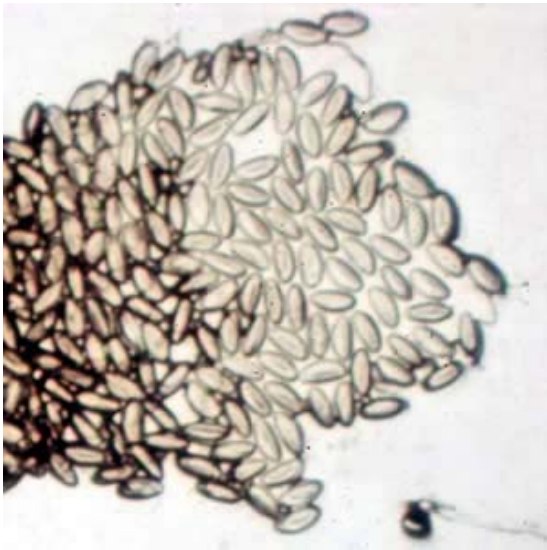
- Two of the most common nematode infections worldwide are pinworm, which is caused by *Enterobius vermicularis*, and whipworm, which is caused by *Trichuris trichiura*.
- Enterobiasis is found worldwide in both temperate and tropical climates. It occurs most frequently in school children aged 5 to 10 years and is relatively uncommon in those under two years old.
- Life cycle — *E. vermicularis* has a simple life cycle, which contributes to its high prevalence. The adults live in the human gastrointestinal (GI) tract, mainly in the cecum and appendix. Each female worm can produce 10,000 or more eggs. Unlike most worms that release their eggs within the intestine, the female instead migrates out through the rectum onto the perianal skin to deposit her eggs. This usually occurs at night. Larvae inside the eggs develop into an infective form over approximately six hours, and the eggs can then be ingested by the same host (autoinfection) or by another person. The eggs begin to lose infectivity after one to two days under warm and dry environmental conditions but may survive more than two weeks in cooler, more humid environments. Following ingestion, the eggs hatch and release larvae within the intestine. Larvae develop into adult worms over a period of several weeks, thereby completing the life cycle. Adult females live for approximately three months.
- Transmission — via direct anus to mouth spread from contact with an infected person or via airborne eggs that are dislodged from contaminated clothing or bed linen. Eating food that has been touched by soiled hands can also spread the infection. Spread within families is common.

Signs and Symptoms

- Asymptomatic is common
- **Pruritus ani** — most common symptom (perianal itching)
- Nocturnal restlessness and insomnia secondary to itching.
- Secondary bacterial infections can result if the excoriation is severe.
- Abdominal symptoms — The worm burden is occasionally so high that abdominal pain, nausea, and vomiting develop. Eosinophilic enterocolitis can also result.
- Other symptoms from ectopic sites — The adult worm can also migrate from the perianal region into the genital tract of the female host, resulting in vulvovaginitis. This can make the host more susceptible to urinary tract infections. Adult pinworms can also travel to other ectopic sites resulting in salpingitis, oophoritis, cervical granulomas or peritoneal inflammation. *Enterobius* infestation of the nasal mucosa has also been described.

Diagnosis

- **Scotch tape test** — The "scotch tape" test is performed by sticking clear cellophane scotch tape onto a wooden stick, and then doubling it over so that the sticky side points outwards. This should be pressed against the perianal skin, and eggs will stick to the tape. These eggs can be placed onto a glass slide and be directly visualized under a microscope. The highest diagnostic yield is obtained if the scotch tape test is performed at night or first thing in the morning prior to bathing. Repeat testing may be necessary to increase the sensitivity, since a single specimen detects approximately 50 percent of cases and three swabs approximately 90 percent.
- Eggs asymmetrically flattened on one side, "bean-shaped" appearance. Female adult worms, which are white, pin-shaped, and 8 to 13 mm long, may also be found in the perianal area.



1) Eggs of *E. vermicularis* from cellulose-tape preparation. 2) Eggs of *E. vermicularis* in a wet mount.

Treatment

Mebendazole 100mg po once

Albendazole >2 years old: 400mg po once

<2years old: 100mg po once

Both Can be repeated after one or two weeks to increase cure rate.

TRICHURIASIS “WHIP WORM”

Trichuriasis is caused by infection with the nematode, *T. trichiura*.

Background

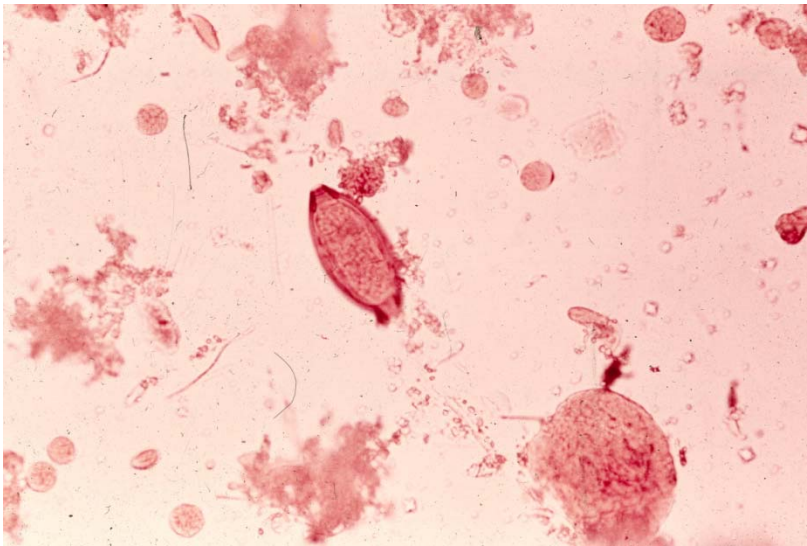
- 1/4 of the world population carries this parasite, most common in tropical regions. *T. trichiura* is frequently found as a pathogen in association with other geohelminths, especially *Ascaris lumbricoides*, since these pathogens thrive under similar conditions.
- Transmission: fecal oral spread,
- *Life cycle*: Eggs are ingested, reach the intestine, and hatch to release larvae. Larvae develop into adult worms over a period of approximately two to three months. The male and female both live in the human intestine, with the thin end embedded in the bowel mucosa, and the thick end visible within the bowel lumen. The adults measure approximately 4 cm in length. The male has a curved tail, which distinguishes it from the female. Adults live for one to three years.
- In light infections, most worms are found in the cecum and ascending colon, whereas in heavy infections, the distal colon and rectum also harbor adult worms. The worms mate and the females produce up to 20,000 eggs per day which are passed out in the stool. Egg maturation occurs in the environment, and the embryonated eggs containing infectious larvae develop after approximately two weeks.
- Following infection, eggs will not be detectable in the stool for approximately three months. This time frame is called the prepatent period.

Signs and Symptoms

- Asymptomatic is most common
- Diarrhea or Loose Stools — with mucus and/or blood
- Nocturnal stooling is quite common.
- Anemia (can have Pica present)
- Rectal prolapse — The most characteristic clinical finding in trichuriasis is rectal prolapse. This occurs mainly in heavily infected individuals, and worms may be directly visible embedded in the mucosa of the prolapsed, inflamed rectum.
- Pica
- Finger nail clubbing are other potential clues to the diagnosis.
- Impaired growth or cognition in children..

Diagnosis

- Stool examination for the characteristically barrel shaped eggs.
 - The Kato-Katz technique is used to quantify egg numbers and is expressed as eggs per gram of stool. This number tends to correlate with the adult worm burden.
- Proctoscopy can also be performed and often shows adult worms protruding from the bowel mucosa.
- Infected individuals may have a peripheral eosinophilia of up to 15 percent.



Treatment

Mebendazole, three days of mebendazole 100 mg PO BID

Albendazole 400 mg po daily for three days, treat for 5 to 7 days for patients with heavy infections (at least 1000 Trichuris eggs/g faeces).

HELICOBACTER PYLORI¹

Background

- Found in 60% of biopsies specimens from Haitians with chest pain and/or epigastric pain. (SC Kiely, et al Journal of Health Care for the Poor and Underserved, 2004 - muse.jhu.edu)
- Known to be endemic in the area
- Found in ulcerative and nonulcerative gastritis
- Increases risk of gastric cancer

Symptoms

- Asymptomatic
- Gastritis
- Gastric ulcers
- Gastric cancer
- Abdominal pain
- Appetite changes

Diagnosis

- Urease breath test
- Serology

Treatment

Administer triple therapies for 10-14 days. The treatment regimens are:

- omeprazole, amoxicillin, and clarithromycin (OAC) for 10 days
- bismuth subsalicylate, metronidazole, and tetracycline (BMT) for 14 days
- lansoprazole, amoxicillin, and clarithromycin (LAC) for either 10 days or 14 days of treatment.

MUSCULOSKELETAL SYMPTOMS

LYMPHATIC FILARIASIS

(from eMedicine 7/23/2009)

Signs and Symptoms

- *Acute manifestations*: episodic attacks of fever, inflammation of the inguinal lymph nodes, testis, spermatic cord, lymphedema, or a combination of these. Skin exfoliation of the affected body part usually occurs with resolution of an episode.
- *Repeated episodes* of inflammation and lymphedema lead to lymphatic damage; chronic swelling; and *elephantiasis* of the legs, arms, scrotum, vulva, and breasts.
- Hydrocele is the most common manifestation of chronic *W bancrofti* infection in males in endemic areas but is rare with *B malayi* and *B timori* infection.
- Chyluria also may be present in chronically infected persons.

Diagnosis

Detection of microfilariae in the peripheral blood or skin by microscopy, prevalence as high as 20% in Leogane

Treatment

- Patients with asymptomatic microfilaremia can be treated on an outpatient basis.
- Supervision of oral DEC therapy and provocation with postadministration observation is recommended for patient compliance with therapy and for the management of febrile reactions in heavily infected patients.
- Inpatient care initially may be required for ADL and chronic filariasis and includes antihistamines, steroids, pain relief, and intravenous antibiotics for secondary infections.
- Bed rest, limb elevation, and compression bandages traditionally have been used for the management of chronic lymphedema. *Self-care of elephantitis as described on the CDC handout for patients has been shown to have benefit over time.*
- Steroids can be used to soften and reduce the swelling of lymphedematous tissues.

Medication

Ivermectin (Mectizan)

Adult: 150-200 mcg/kg/d PO as single dose; repeat q2-3mo

Pediatric: <5 years or <15 kilograms: Not recommended

>5 years: Administer as in adults

Diethylcarbamazine (Hetrazan) DEC

Adult: 6 mg/kg PO qd for 12 d to 3 wk

Pediatric: Administer as in adults

Precautions: Caution in individuals with potential heavy infections of lymphatic filarioids because a DEC dose of 2 mg/kg may provoke a febrile and inflammatory reaction secondary to worm death; antipyretics and steroids may decrease the risk of these symptoms.

Albendazole

Adult: 400 mg PO single dose

Pediatric: Administer as in adults

Prevention

The best way to prevent lymphatic filariasis is to avoid mosquito bites. The mosquitoes that carry the microscopic worms usually bite between the hours of dusk and dawn. If you live in an area with lymphatic filariasis:

- Sleep under a mosquito net
- Wear long sleeves and trousers
- Use mosquito repellent on exposed skin between dusk and dawn

Global Programme to Eliminate Lymphatic Filariasis is in Haiti and consists of mass drug treatment with DEC and albendazole. Due to poor response in the reduction of LF in Haiti, Bed Nets are now being added to the program. **Please encourage your patients to comply with the program (take the medicine and use bednets). The program needs higher levels of compliance to be effective and stop this debilitating disease.**



TROPICAL PYOMYOSITIS

Risk factors for *Staphylococcus aureus* pyomyositis - Strenuous activity, muscle trauma, skin infections, infected insect bites, illicit drug injections, and diabetes

Causes

- Bacterial -S aureus (most common, 70%); Streptococcus viridans; Streptococcus pyogenes; Streptococcus pneumoniae; Salmonella enteritidis; Klebsiella pneumoniae; Clostridium freundii; Bartonella; gram-negative organisms including Escherichia coli and Pseudomonas aeruginosa, Neisseria, Yersinia, Morganella morganii, and Citrobacter species

Symptoms

- Fever and malaise
- Abscess - *Subtle symptoms such as fever and flank and pain(leg for quadriceps, hip for psoas muscles); may manifest as pyrexia of unknown origin*

Signs

- Muscles are painful, swollen, tender, and indurated.
- Quadriceps muscle is involved most commonly.
- The second most common location is the psoas muscle, followed by the upper extremities.
- Depending on the site of involvement, it may mimic appendicitis (psoas muscle), septic arthritis of the hip (iliacus muscle), or epidural abscess (piriformis muscle).
- Findings may be subtle in immunocompromised persons requiring a high index of suspicion for diagnosis.

Diagnosis

- Leukocytosis
- Elevated erythrocyte sedimentation rate
- Serum creatine kinase (CK) and aldolase usually normal
- Blood culture results generally negative.
- CT scanning may show hypertrophy of involved muscle groups and effacement of the fat planes. Contrast enhancement may indicate abscess formation. CT is also useful for distinguishing tumors and hematomas from abscess.
- Ultrasound or MRI also may be used to localize involved muscle. MRI is helpful in differentiating pyomyositis from osteomyelitis. MRI is also the imaging modality of choice for evaluating pelvic infections.
- Gallium scan is useful for localization in the early stages of illness.

Treatment

Refer to hospital for IV antibiotics and possible drainage

- Promptly administer systemic antibiotics. This could eliminate the need for surgical drainage in selected cases.
- The choice of antibiotic is determined by identification of the causative organism.
- Antibiotics initially are given intravenously until clinical improvement is noted, followed by oral antibiotics for a total course of 3 weeks (eg, Cefazolin or Ceftriaxone IV followed by Cephalexin PO).

Surgical Care - During the suppurative phase, abscess aspiration under ultrasonic or CT guidance may be required. Surgical drainage is especially necessary for large abscesses.

TETANUS¹

92 cases in Haiti in 2007

Symptoms

- *The hallmark feature of tetanus is muscle rigidity and spasms.*
- In generalized tetanus, the initial complaints may include any of the following:
 - Irritability, muscle cramps, sore muscles, weakness, or difficulty swallowing are commonly seen.
 - Facial muscles are often affected first. Lockjaw is most common. A sardonic smile -- medically termed *risus sardonicus* -- is a characteristic feature that results from facial muscle spasms.
 - Muscle spasms are progressive and may include a characteristic arching of the back. Muscle spasms may be intense enough to cause bones to break and joints to dislocate.
 - Severe cases can involve spasms of the vocal cords or muscles involved in breathing. If this happens, death is likely, unless medical help (mechanical ventilation with a respirator) is readily available
- In cephalic tetanus, in addition to lockjaw, weakness of at least one other facial muscle occurs. In two-thirds of these cases, generalized tetanus will develop.

- In localized tetanus, muscle spasms occur at or near the site of the injury. This condition can progress to generalized tetanus.
- Neonatal tetanus is identical to generalized tetanus except that it affects the newborn infant. Neonates may be irritable and have poor sucking ability or difficulty swallowing.

Treatment

- Antibiotics
Metronidazole to kill the bacteria, tetanus booster shot, if necessary, and occasionally, antitoxin to neutralize the toxin. If a mixed infection is the suspected cause of tetanus, a first, second or third-generation cephalosporin such as cefazolin, cefuroxime, or ceftriaxone can be administered for 3 to 7 days or until there are no visible signs of active local infection.
- Wound cleansing and supportive measures
- Pain medicine as needed
- Sedatives such as diazepam (Valium) to control muscle spasms
- Ventilator support to help with breathing in the event of spasms of the vocal cords or the respiratory muscles
- IV rehydration because, as muscles spasm constantly, increased metabolic demands are placed on the body

Immunization update

- The initial series for non-immunized adults involves three doses of Tdap:
 - The first and second doses are given four to eight weeks apart.
 - The third dose is given six months after the second.
 - Booster doses are required every 10 years after that.
- In children, the immunization schedule calls for five doses of DTaP.
 - One dose is given at 2, 4, 6, and 15-18 months of age.
 - This DTaP series is completed with a final dose when the child is between 4-6 years of age.
- Additional boosters with Tdap are given every 10 years after the final DTaP dose. Children that miss doses of DTaP can be given Tdap doses, but the choice for dose schedule should be determined by the patients' doctor.
- People who are not completely immunized and have a tetanus-prone wound should receive a tetanus booster in addition to tetanus antibodies (human tetanus immune globulin or TIG). The tetanus antibodies (TIG) will provide short-term protection against the disease. For patients sensitive to the combined vaccines (DTaP or Tdap), other vaccines against tetanus are available (for example, Td), but the patients' doctor should determine the dosage schedule.

HEADACHE

A common complaint encountered by our providers. Headache type is often not determined but it is important to confirm it is not from hypertension, infection or acute vascular. Typically the headaches are of unclear etiology can be treated with Tylenol/asprin/ibuprofen and reassurance.

Differential Diagnosis	Key History
<ul style="list-style-type: none">• Migraine• Tension• Sinus• Hypertension• Head/Neck Trauma• Cranial or cervical vascular disorders (hemorrhage, aneurysm, temporal arteritis, etc)• Tumor• CNS Infection• Psychiatric• Substance withdrawal• Medication side effect or overuse• Ophthalmoplegic• Childhood syndromes• Cluster• Dehydration• Malaria• Other	<ul style="list-style-type: none">• Duration• Location• Temperature• Blood Pressure• Medications• Timing of headache

EYE COMPLAINTS

Eye complaints are very common in the clinics in Haiti. Recommended treatment for most eye complaints is: reassurance, glasses if indicated and available, antibiotic drops for infection as indicated.

Will need to refer to hospital for severe eye complaints, particularly concern for glaucoma or severe infection.

ITCHY/DRY EYES

Allergic, sjogren syndrome, vitamin A deficiency, aging, dehydration, foreign body, medication, eye muscle strain, Infection, lacrimal gland dysfunction, glaucoma, conjunctivitis, blepharitis, other

EYE PAIN

Dry eyes, infection, eye muscle strain, foreign body, trauma, glaucoma, conjunctivitis, blepharitis, other

DISCHARGE

Infection, allergic, lacrimal gland dysfunction, other

CLOUDING OF THE EYE

The most common cause is cataracts which are very common in Haiti. Many studies suggest that exposure to ultraviolet light is associated with the development of cataracts. Practitioners recommend wearing sunglasses and a wide-brimmed hat to lessen exposure.

When symptoms appear, reading glasses may provide some improvement in vision. Unfortunately, surgery for progressive disease is limited in Haiti.

STD AND GYNECOLOGICAL COMPLAINTS

Differential Diagnosis for Discharge	Differential Diagnosis for Ulcers
<ul style="list-style-type: none"> • Physiologic • Yeast • Bacterial Vaginosis • Gonorrhea • Chlamydia • Trichomonas • Nongonococcal urethritis 	<ul style="list-style-type: none"> • Herpes • Chancroid • Syphilis • Local Trauma • Chlamydia trachomatis - (lymphogranuloma venereum), • Klebsiella granulomatis - (donovanosis or granuloma inguinale)

GONORRHEA²

Caused by *Neisseria gonorrhea*

Infection in women is often **asymptomatic** compared to men who are asymptomatic 10% of the time.

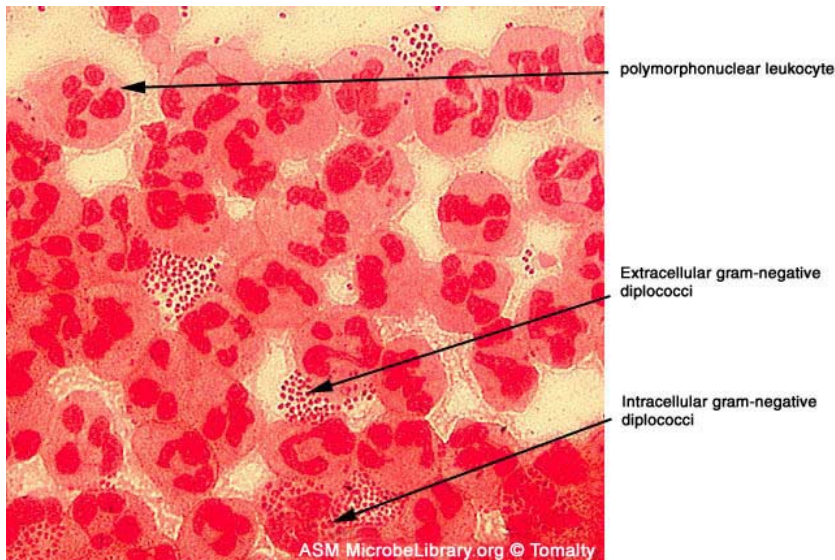
Signs and Symptoms

- Cervical infection
 - vaginal pruritis
 - mucopurulent discharge
 - friable cervical mucosa
 - pain (usually starts as infection ascends)
- Bartholin's gland or Skene's gland abscess and infection
- PID
- Oropharyngeal infection:
 - pharyngitis

Diagnosis

- *Usually based on risk factors and symptoms in Haiti.*
- Culture — not easily available in Haiti but is the gold standard
- Gram stain — The use of Gram stain for the diagnosis of cervical gonorrhea, which appear as intracellular gram-negative diplococci, is only

60 percent sensitive in symptomatic women compared with 95 percent in symptomatic men.



Treatment

(Treat sexual partners. Avoid sexual contact until treatment is complete.)

Azithromycin (1 g orally once) or Doxycycline (100 mg orally two times daily x seven days)

Ceftriaxone 125 mg IM once OR Cefixime 400 mg orally once

Spectinomycin (single dose of 2 g IM) can be considered outside of the United States if available

Ciprofloxacin 500 mg orally in a single dose

Antibiotic resistance — Surveillance of resistance patterns in *N. gonorrhoeae* have demonstrated increased resistance to a variety of agents including penicillin, tetracycline and ciprofloxacin worldwide. *Due to rising rates of gonococcal resistance, the CDC no longer recommends the use of fluoroquinolones for the treatment of gonorrhea infections, including other diseases that may be associated with gonorrhea, such as pelvic inflammatory disease.*

NON-GONOCOCCAL URETHRITIS²

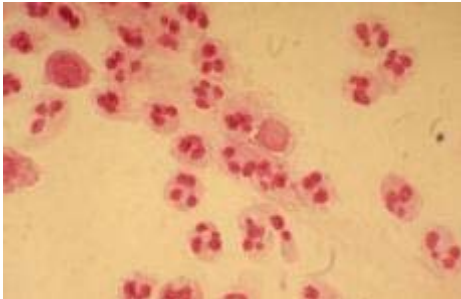
Causes - *Mycoplasma* and *Ureaplasma* species

Signs and Symptoms

- Mucopurulent or purulent urthethral/vaginal discharge
- Dysuria
- hematuria,
- PID
- Endometritis
- Can also cause:
 - Infectious arthritis
 - Surgical wound infections
 - Neonatal pneumonia
 - Neonatal meningitis

Diagnosis

Made by culture



TREATMENT

Treatment for GU infections is empiric based on symptoms.

Azithromycin 1 g orally for a single dose

Doxycycline 100 mg orally BID x 7 days

Erythromycin 500 mg orally QID x 7 days

CHALMYDIA TRACHOMATIS

Symptoms	Risk Factors
Women <ul style="list-style-type: none"> Easily induced endocervical bleeding Mucopurulent endocervical discharge Intermenstrual bleeding Cervical discharge Dysuria Abdominal pain Men <ul style="list-style-type: none"> Urethral discharge Urinary frequency and/or urgency Dysuria Scrotal pain/tenderness Perineal fullness (related to prostatitis) 	<ul style="list-style-type: none"> Nonwhite race Multiple sexual partners Age younger than 19 years Poor socioeconomic conditions Single marital status Nonbarrier contraceptive use

Diagnosis

- In Haiti need to treat based on symptoms and risk
- Multiple specific diagnostic tests including DNA, PCR, antigen detection all exist, cultures can also be done.

TREATMENT

Azithromycin 1 g p.o. (single dose)

Doxycycline 100 mg p.o. BID x 7 days.

Erythromycin base 500 mg PO qid for 7 days

Erythromycin succinate 800 PO qid for 7 days

*Erythromycin is drug of choice during pregnancy

PELVIC INFLAMMATORY DISEASE^{1,2}

(from http://www.akhdem.co.nz/pelvic_inflammatory_disease.htm)

Cause	Symptoms/Signs
<ul style="list-style-type: none">• Chlamydia trachomatis (most common)• Neisseria gonorrhea• Gram negative facultative bacteria• Anaerobes• Streptococci• Mycoplasma hominis• Group A streptococci• Other bacteria possible especially after intrauterine procedures	<ul style="list-style-type: none">• Pelvic pain• Abdominal pain• Vaginal discharge• Dysuria• Fever• Dyspareunia• Menorrhagia• Pain with menses• Nausea and emesis

Diagnosis

Clinical	Complications
<ul style="list-style-type: none">• Cervical Motion Tenderness• +/- Fever• Vaginal discharge	<p>Acute:</p> <ul style="list-style-type: none">• Peritubal abscess• Peritonitis• Fitzhugh-Curtis Syndrome (Perihepatitis) <p>Chronic:</p> <ul style="list-style-type: none">• Infertility• Chronic Pain• Recurrent infection• Increased risk of ectopic pregnancy

*Can be caused by other vaginal bacteria especially after Intrauterine procedures: Hysteroscopy, D &C, Recent IUCD insertion, Hysterosalpingograms, Childbirth, Caesarean section

Differential Diagnosis

- Causes for acute abdomen (especially appendicitis)
- Gynecological pathology
 - Endometriosis
 - Corpus luteal bleeds / ovarian cyst
 - Ectopic pregnancy
 - Pelvic adhesions
 - Ovarian tumour
 - Chronic salpingitis

Risk Factors

- Sexually active
- Young age (75% PID occur in people younger than 25 years old)
- Smokers
- Previous PID
- Exposure to STD
- Multiple sexual partners
- Intrauterine procedures

TREATMENT

Ofloxacin 400 mg orally BID x 14 days - OR – Metronidazole 500 mg orally BID x 14 days

Ceftriaxone 250 mg IM x 1 dose - OR – Cefoxitin 2 g IM plus Probenecid 1 g orally in a single concurrent dose

Parenteral third-generation cephalosporin PLUS Doxycycline 100 mg orally BID x 14 days. *(Include this regimen with one of the above regimens.)*

Fitzhugh-Curtis Syndrome (Perihepatitis)

- Infection travelling up the paracolic gutters resulting in a peri liver capsulitis
- 3 – 10% of PID
- Lower abdo pain / RUQ pain / right pleuritic chest pain / vaginal discharge / fever
- Cervical motion tenderness and adnexal tenderness
- LFT's usually normal
- Liver / biliary ultrasound usually normal

Clinical Pearls

IMPORTANT POINTS

- High suspicion, early diagnosis and treatment
- Over diagnosis and over treatment preferred BUT important to exclude other surgical pathologies first

TROCHOMONAS

Caused by *Trichomonas vaginalis*

Symptoms and Signs

Women

- Purulent or homogenous vaginal discharge (often yellow-green in color)
- Abnormal odor
- Purities
- Dysuria
- Urinary frequency
- Pain and/or bleeding with intercourse
- vulvar or vaginal erythema are common.
- Colpitis macularis, or strawberry cervix, describes a diffuse or patchy macular erythematous lesion of the cervix.
- Punctate hemorrhages on cervix or vaginal walls
- Lower-abdominal tenderness

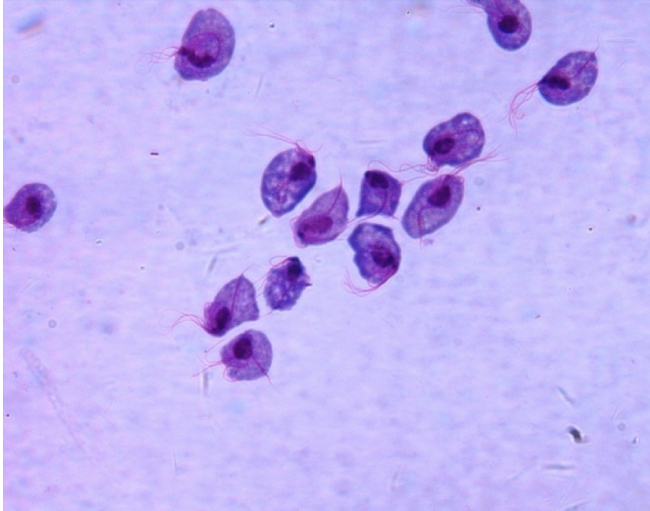
Men

- Generally unremarkable
- It may be associated with local inflammatory states, including balanitis and balanoposthitis.
- Epididymitis
- Prostatitis

Coexisting [*Neisseria gonorrhea*](#) infection, candidiasis, and bacterial vaginosis are common

Diagnosis

- Wet mount with visualization of motile trichomonads and large number of WBC (PMN's) are usually seen
- pH is >4.5
- Cultures and PCR are also available but unlikely to be done in Haiti



Treatment

- Metronidazole - One time dose of 2 grams (four 500 mg tablets) orally
- Tinidazole can also be used at 2 gm PO once
- Treat sexual partner; avoid sexual contact until treatment is complete.

CANDIDA VULVOVAGINITIS

(from Jack D Sobel, MD, February 11, 2009)

Risk Factors

- Recent antibiotic use, DM, increased estrogen levels, immunosuppression, contraceptive devices
- Most infections occur without a known risk factor preceeding them

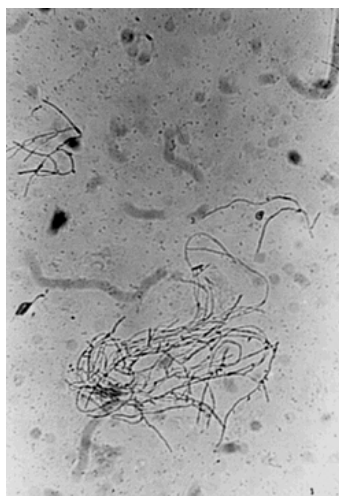
Signs and Symptoms

- Vulvar pruritus
- Dysuria (typically perceived to be external or vulvar rather than urethral)
- Soreness, irritation
- dyspareunia (pain with intercourse)
- Discharge: can be absent or white and clumpy (curd-like).
- Physical examination often reveals erythema of the vulva and vaginal mucosa and vulvar edema. The discharge is classically described as thick, adherent, and "cottage cheese-like." However, it may also be thin and

loose, indistinguishable from the discharge of other types of vaginitis. Some patients, primarily those with *C. glabrata* infection, have little discharge and often only erythema on vaginal examination. Evidence of excoriation and fissures may be present.

Diagnosis

- Wet Mount/KOH Slide: budding yeasts seen
- Vaginal pH is typically 4 to 4.5



Differential Diagnosis

Other conditions to be considered in the differential diagnosis of symptomatic women with normal vaginal pH include hypersensitivity reactions, allergic or chemical reactions, and contact dermatitis. If vaginal pH exceeds 4.5 or excess white cells are present, mixed infection with Bacterial vaginosis or trichomoniasis may be present.

Treatment

- Fluconazole 150mg po once
- Can also use other antifungals topical clotrimazole and miconazole are also effective.

BACTERIAL VAGINOSIS

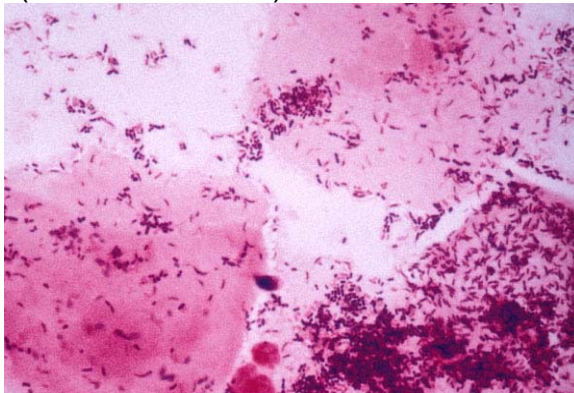
Signs and Symptoms

- "Fishy smelling" discharge that is more noticeable after coitus. Discharge → off-white, thin, and homogeneous.
- Dysuria and dyspareunia are rare, while pruritus, erythema, and inflammation are typically absent. BV can be associated with cervicitis (endocervical mucopurulent discharge or easily induced bleeding), with or without concomitant chlamydial or gonococcal infection.

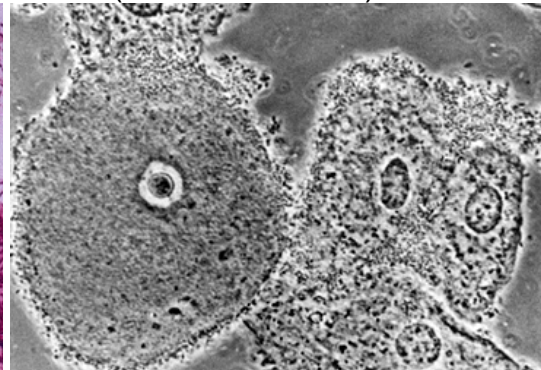
Diagnosis

- Clue cells on wet prep
- Rapid tests do exist.
- Vaginal pH >4.5
- The diagnosis of BV is based on clinical findings and laboratory testing. Three of the four criteria (ie, Amsel criteria) listed below are necessary for diagnosis, although the first three findings are sometimes present in patients with trichomoniasis.
 - Homogeneous, thin, grayish-white discharge that smoothly coats the vaginal walls
 - Vaginal pH greater than 4.5
 - Positive whiff-amine test, defined as the presence of a fishy odor when 10 percent potassium hydroxide (KOH) is added to a sample of vaginal discharge
 - Clue cells on saline wet mount

(BV smear- below)



(Clue cells- below)



Treatment

- Metronidazole 0.75% gel topically 5g applied daily x 5 days, or 500 mg p.o. BID x 7 days –or- 250 mg TID x 7days.
- Clindamycin 300 mg p.o. BID x 7 days.

SYPHILIS

The median incubation period before clinical manifestations is 21 days.

Signs and Symptoms

Primary Signs/Symptoms	Secondary Signs and Symptoms	Tertiary Signs and Symptoms “gummatous syphilis”
Painless chancres: raised, firm papules that can be several centimeters in diameter, erodes to create an ulcerative crater within the papule, with slightly elevated edges around the central ulcer.	<ul style="list-style-type: none"> Localized or diffuse mucocutaneous rash: <ul style="list-style-type: none"> macular, papular, pustular, or mixed. Early syphilitic lesions are typically round, discrete, reddish brown macules and are usually distributed on the trunk and extremities. These measure approximately 5 mm in diameter. The rash is nonpruritic, and the macules are symmetric. Red papular lesions may appear on the palms, soles, face, and scalp and may become necrotic. The lesions can cross the lifelines of the palms and soles. Alopecia may also occur. Generalized nontender lymphadenopathy Malaise Sore throat 	<p>Can affect any organ</p> <ul style="list-style-type: none"> Cutaneous gummas: single or multiple, asymmetric and grouped together Fever Jaundice Anemia Nighttime skeletal pain Cardiovascular syphilis usually involves the aorta & causes aneurysm formation Neurosyphilis manifests as an insidious but progressive loss of mental and physical functions and is accompanied by mood alterations. It is caused by invasion of <i>T pallidum</i> into the CNS. Neurosyphilis chiefly manifests as the 3 following entities: <ul style="list-style-type: none"> Meningovascular syphilis is characterized by obliterative endarteritis and perivascular inflammation in the brain. Paretic syphilis is the result of widespread parenchymal invasion that causes individual cell death and brain

	<ul style="list-style-type: none"> • Headache • Fever • Anorexia • Rarely - meningismus, nephropathy, proctitis, arthritis, hepatitis 	<p>atrophy.</p> <ul style="list-style-type: none"> ○ Tabes dorsalis is the result of damage to the sensory nerves in dorsal roots, producing ataxia and loss of pain sensation, proprioception, and deep tendon reflexes in joints.
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Latent phase: asymptomatic and can last from a few years to 25 years

Primary syphilis in top two, below; secondary syphilis in bottom left; tertiary in bottom right



Diagnosis

By serologic test - RPR, VDRL, FTA-ABS

RPR is available at FHM's Blanchard Clinic

Treatment

(same for any stage)

- Single dose of Benzathine PCN G (2.4 million units IM)
- Tetracyclines — 500 mg PO four times daily for PCN allergic patients
- Doxycycline 100 mg BID x 15 days (1st line agent for the PCN-allergic patient with early syphilis)
- Ceftriaxone — Limited clinical data suggest that ceftriaxone may be effective for tx of early latent and late latent syphilis; the optimal dose and duration have not been defined. Some specialists recommend 1 gram daily for 8 to 10 days

Note: Syphilis is one of the TORCH infections.

Early Congenital Syphilis:

- Rash
- Hemorrhagic rhinitis
- Periostitis
- Pseudoparalysis, often due to pain secondary to osteochondritis
- Mucous patches
- Perioral fissures
- Hepatosplenomegaly
- Generalized lymphadenopathy
- Hydrops
- Glomerulonephritis
- Thrombocytopenia
- Neurologic involvement
- Ocular involvement

Late Congenital Syphilis

- Mulberry molars
- Deafness
- Paroxysmal cold hemoglobinuria
- Gummatous involvement
 - Prominent frontal bones, depression of nasal bridge, abnormal maxilla development, anterior tibial bowing
- Clutton joints (arthritis of both knees)
- Interstitial keratitis
- Hutchinson incisors

HERPES SIMPLEX (HSV1, HSV2)²

Signs and Symptoms

- Painful genital ulcers, dysuria, fever, tender local inguinal lymphadenopathy, and headache.
- Infection can be mild, subclinical, or entirely asymptomatic.
- Systemic symptoms, including fever, headache, malaise, and myalgias (67 percent), Local pain and itching (98 percent) , Dysuria (63 percent) ,Tender lymphadenopathy (80 percent)
- Infections can also occur in the skin bordering the mouth (labialis), gums (gingivostomatitis), oropharynx (pharyngotonsillitis).

Infection can be passed in child birth and lead to encephalitis or meningitis in neonate.

Diagnosis

- Tzanck smear
- PCR, DFA
- Viral culture



Treatment

ANTIVIRAL AGENTS — Acyclovir, Famciclovir, and Valacyclovir appear to have similar efficacy for the treatment of primary genital herpes and for the suppression of recurrent infection.

TREATMENT OF PRIMARY HSV:

- Acyclovir: 400 mg PO three times per day or 200 mg PO five times per day
- Famciclovir: 250 mg PO three times daily
- Valacyclovir: 1000 mg PO twice daily

CHANCROID

Caused by *H. ducreyi*

Signs and Symptoms

- Painful genital ulcer with distinct borders and erythematous base, covered with a gray or yellow purulent exudate and bleeds when scraped.
- Painful inguinal lymphadenitis.

Diagnosis

- **Clinical Criteria:**
 - **Definite** — Isolation of *H. ducreyi* from the lesion
 - **Probable** — Clinical findings compatible with the diagnosis (painful genital ulcer and tender suppurative inguinal adenopathy) plus negative darkfield microscopic examination for *Treponema pallidum*, negative serologic test for syphilis, and negative culture for herpes simplex virus (HSV) or a clinical presentation not typical for herpes.
- Gram stain — Gram stain of the exudate from an ulcer can show typical small gram-negative rods in a chain, the so-called "school of fish". However, the sensitivity of the Gram stain is poor.
- Culture



TREATMENT

Azithromycin given as a single 1000 mg dose

Ceftriaxone given as a single 250 mg intramuscular injection

Ciprofloxacin (500 mg) single

HIV¹

Symptoms	Opportunistic Infections
<p>Acute Infection:</p> <ul style="list-style-type: none"> • flulike illness • fever • malaise • generalized rash. <p>AIDS:</p> <ul style="list-style-type: none"> • Generalized Lymphadenopathy • Weight loss • Blindness or vision loss • Dementia • Wasting • Severe infections (normal organisms) 	<ul style="list-style-type: none"> • Candidiasis of bronchi, trachea, or lungs • Candidiasis, esophageal • Cervical cancer, invasive* • Coccidioidomycosis, disseminated or extrapulmonary • Cryptococcosis, extrapulmonary • Cryptosporidiosis, chronic intestinal (duration >1 mo) • Cytomegalovirus disease (other than liver, spleen, or nodes) • Cytomegalovirus retinitis (with vision loss) • Encephalopathy, HIV-related • Herpes simplex - Chronic ulcer or ulcers (duration >1 mo) or bronchitis, pneumonitis, or esophagitis • Histoplasmosis, disseminated or extrapulmonary • Isosporiasis, chronic intestinal (duration >1 mo) • Kaposi sarcoma • Lymphoma, Burkitt (or equivalent term) • Lymphoma, immunoblastic (or equivalent term) • Lymphoma, primary, of the brain • <i>Mycobacterium avium</i> complex or <i>Mycobacterium kansasii</i> infection, disseminated or extrapulmonary • <i>Mycobacterium tuberculosis</i> infection, any site (pulmonary* or extrapulmonary) • <i>Mycobacterium</i> infection with other species or unidentified species, disseminated or extrapulmonary • Pneumocystis pneumonia • Pneumonia, recurrent* • Progressive multifocal leukoencephalopathy

- *Salmonella* septicemia, recurrent
- Toxoplasmosis of the brain
- Wasting syndrome due to HIV infection

HIV in Haiti

The HIV rate in Haiti is around 2-3% for the general population. Many married women still have risk of exposure because of polygamy and extramarital relationships of the men. There are wide-spread campaigns in Haiti aimed at reducing the prevalence and providing treatment.

Risk Factors

- Multiple sexual partners
- Homosexual contact
- Blood transfusion
- Needle stick
- Other STD (higher risk of transmission of HIV with HSV, gonorrhea and Chlamydia)
- IV drug user
- Mother with HIV

Diagnosis

HIV testing can be done at FHM's Blanchard Clinic, GHESKIO and other hospitals

Treatment

(available either free or at low cost)

GHESKIO in Port Au Prince (33 Blvd Harry Truman, PAP 222-0031 or 222-2241)

Croix des Missions

MALNUTRITION

Indicators for Haiti (2006 data)	Value (year)
Children under five years of age overweight for age (%)	3.9
Children under five years of age stunted for age (%)	29.7
Children under five years of age underweight for age (%)	18.9

(WHO, 2008)

PROTEIN-ENERGY MALNUTRITION

Signs and Symptoms

Clinical findings in children with chronic under-nutrition usually include diminished height, poor weight gain, and deficits in lean body mass and adipose tissue. Other features include reduced physical activity, mental apathy, and retarded psychomotor and mental development.

Worldwide, severe protein energy malnutrition is a leading cause of death among children younger than five years of age. Severe protein-energy malnutrition is associated with one of two classical syndromes, marasmus (wasting syndrome) and kwashiorkor, or with manifestations of both. Each type of protein-energy malnutrition may be classified as acute or chronic, depending upon the duration of nutritional deprivation. Children with acute malnutrition appear wasted, whereas children with chronic malnutrition have stunted linear growth. Malnourished children also suffer a number from numerous associated complications. They are more susceptible to infection, especially sepsis, pneumonia, and gastroenteritis. Vitamin deficiencies and deficiencies of minerals and trace elements can also be seen.

MARASMUS — “SKIN AND BONES”

- Marasmus is characterized by the wasting of muscle mass and the depletion of body fat stores. It is the most common form of Protein Energy Malnutrition (PEM) and is caused by inadequate intake of all nutrients, but especially dietary energy sources (total calories). *Classically, children with marasmus may have severe constipation and are ravenously hungry once refeeding is in progress.*
- Physical examination findings include:
 - Diminished weight and height for age
 - Emaciated and weak appearance

- Bradycardia
- hypotension
- hypothermia
- Thin, dry skin
- Redundant skin folds caused by loss of subcutaneous fat
- Thin, sparse hair that is easily plucked.

KWASHIORKOR “EDEMATOUS WITH POT BELLY”

- Kwashiorkor is characterized by marked muscle atrophy with normal or increased body fat. It is caused by inadequate protein intake in the presence of fair to good energy intake. *Anorexia is almost universal.*
- Physical examination findings include:
 - Normal or nearly normal weight and height for age
 - Anasarca (extreme generalized edema)
 - Rounded prominence of the cheeks ("moon-face")
 - Pursed appearance of the mouth
 - Pitting edema in the lower extremities and periorbitally
 - Dry, atrophic, peeling skin with confluent areas of hyperkeratosis and hyperpigmentation
 - Dry, dull, hypopigmented hair that falls out or is easily plucked
 - Hepatomegaly (from fatty liver infiltrates)
 - Distended abdomen with dilated intestinal loops.

Adequate protein intake restores hair color, resulting in alternating loss of hair color interspersed between bands of normal pigmentation (flag sign).

MIXED MARASMUS-KWASHIORKHOR

Mixed marasmus-kwashiorkor may occur in a child who has inadequate dietary intake of all nutrients and subsequently develops a common infectious illness of childhood. In this setting, the undernourished child develops hypoalbuminemia and edema because the acute loss of nutrients associated with an inflammatory response is superimposed on the chronic wasting of body fat and muscle nutrient stores.

Diagnosis

Indicator	Measure	Cut-off
Severe wasting	Weight-for-height	<-3SD (<1%)
Severe wasting	MUAC (arm circumference)	<115 mm
Bilateral Edema	Clinical sign	

Assessment of Severity

The degree of acute and chronic malnutrition, characterized as ponderal wasting and linear stunting, respectively, can be assessed clinically using various anthropometric measurements.).

WHO definitions — (See appendix for growth and reference tables to determine z score)

- Wasting (indicates acute malnutrition)
 - Moderate wasting — weight/height z-score <-2 to -3
 - Severe wasting — weight/height z-score <-3
- Stunting (indicates chronic malnutrition)
 - Moderate stunting — height or length z-score <-2 to -3
 - Severe stunting — height or length z-score <-3
- Malnutrition
 - Moderate malnutrition — moderate wasting or stunting
 - Severe malnutrition — severe wasting, severe stunting, OR edematous malnutrition

The severity of wasting is determined as a percentage of the expected weight for height for the population. The expected weight for height is determined by plotting the child's height on the 50th percentile line of the standard growth curve (usually reflecting the size of a younger child) to determine the child's height age and then finding the 50th percentile weight for that age.

Severity is assigned as follows:

- Less than 90 percent: First-degree (mild) acute malnutrition
- Less than 80 percent: Second-degree (moderate) acute malnutrition
- Less than 70 percent: Third-degree (severe) acute malnutrition

The severity of stunting is determined as a percentage of the expected height for age. The measured height is divided by the expected height for age and multiplied by 100.

Severity is assigned as follows:

- Less than 95 percent: First-degree (mild) chronic malnutrition
- Less than 90 percent: Second-degree (moderate) chronic malnutrition
- Less than 85 percent: Third-degree (severe) chronic malnutrition

In the above calculations, the expected height is usually considered to be the 50th percentile height for age for the population. However, if previous serial measurements of the individual child's height are available, then the height for that percentile at the child's age should be used as the expected height, because this provides a more accurate estimate of the child's height potential.

Arm/head circumference — McLaren described an alternative approach to estimate the degree of acute malnutrition in children younger than three years of age and for whom accurate measures of weight or height cannot be obtained. This method uses the mid-upper arm circumference as a proxy for weight and head circumference as a proxy for height. Its accuracy requires that no malformation of the head (eg, microcephaly or hydrocephalus) is present. The degree of acute malnutrition is calculated by dividing the mid-upper arm circumference by the fronto-occipital (head) circumference. Severity is assigned according to the ratio as follows:

- Less than 0.31: First-degree (mild) acute malnutrition
- Less than 0.28: Second-degree (moderate) acute malnutrition
- Less than 0.25: Third-degree (severe) acute malnutrition

No appetite or
medical
complications



**Facility based
care (in-patient)**

F75 -->
F100/RUTF

And 24hr medical
care

Discharge:
reduced edema,
child eating 75%
RUTF (good
appetite)

Appetite

&

No medical
complications



**Community-based
treatment**

RUTF, basic medical
care

15-20% weight gain
release criteria



Treatment

F75, F100 and RUTF are all different forms of therapeutic foods designed for feeding malnourished children

Children with chronic malnutrition may require caloric intakes more than 120-150 kcal/kg/d to achieve appropriate weight gain. The formula for determining adequate caloric intake is: $\text{kcal/kg} = (\text{RDA for age} \times \text{ideal weight}) / \text{actual weight}$

Treatment of children with severe malnutrition needs to be done by experienced providers as children are at risk for complications. Please READ APPENDIX prior to doing any treatment for malnourished children.

Refer children to Children's Nutrition Program of Haiti in Leogane if at all possible as they can do both in and out patient and have well established successful program.

VITAMIN DEFICIENCIES

Most common, clinically important vitamin deficiencies

- Iron - Fatigue, anemia, decreased cognitive function, headache, glossitis, and nail changes
- Iodine - Goiter, developmental delay, and mental retardation
- Vitamin D - Poor growth, rickets, and hypocalcemia
- Vitamin A - Night blindness, xerophthalmia, poor growth, and hair changes
- Folate - Glossitis, anemia (megaloblastic), and neural tube defects (in fetuses of women without folate supplementation)
- Zinc - Anemia, dwarfism, hepatosplenomegaly, hyperpigmentation and hypogonadism, acrodermatitis enteropathica, diminished immune response, poor wound healing

Signs

	Signs	Deficiencies
Hair	Alopecia	Protein-calorie malnutrition
	Brittle	Biotin
	Color change	Zinc
	Dryness	Vitamins E and A
	Easy pluckability	Zinc (?)
Skin	Acneiform lesions	Vitamin A
	Follicular keratosis	Vitamin A
	Xerosis (dry skin)	Vitamin A
	Ecchymosis	Vitamin C or K
	Intradermal petechia	Vitamin C or K
	Erythema	Niacin
	Hyperpigmentation	Niacin
	Scrotal dermatitis	Niacin
Eyes	Angular palpebritis	Vitamin B2
	Bitot's spots	Vitamin A
	Conjunctival xerosis	Vitamin A
Mouth	Angular stomatitis	Vitamin B12
	Atrophic papillae	Niacin
	Bleeding gums	Vitamin C
	Cheilosis	Vitamin B2
	Glossitis	Niacin, folate, vitamin B12
	Magenta tongue	Vitamin B2

Extremities	Genu valgum or varum	Vitamin D
	Loss of deep tendon reflexes of the lower extremities	Vitamins B1 and B12

(Adapted from Bernard, MA, Jacobs, DO, Rombeau, JL. Nutrition and Metabolic Support of Hospitalized Patients. WB Saunders, Philadelphia, 1986)

ESSENTIAL FATTY ACID DEFICIENCY

Protein-energy malnutrition may show deficiencies of the two primary essential fatty acids (EFA), linoleic and linolenic acid. EFA levels may be altered by diet, disease, or prematurity. The biochemical effects of deficiency are an increased triene/tetraene ratio and will be evident prior to any physical changes.

Physical signs include scaly dermatitis, alopecia, and thrombocytopenia. Deficiency of EFA can affect growth, and cognitive and visual function in infants.

FAT-SOLUBLE VITAMIN DEFICIENCIES

Protein-energy malnutrition also may have deficiencies of the fat-soluble vitamins: A, D, E, and K.

VITAMIN A

Vitamin A deficiency is common in the developing world. It is associated with a group of ocular signs known as xerophthalmia. The earliest symptoms are night blindness and dryness of the eyes, which is followed by xerosis of the conjunctiva and cornea. Progression of disease includes keratomalacia, ulceration, perforation and scarring of the cornea, prolapse of the lens, and blindness. Other features of

vitamin A deficiency include follicular hyperkeratosis, pruritus, growth retardation, and increased susceptibility to infection.

Sources: liver, milk, cheese, eggs or food products fortified with vitamin A or lacking its carotenoid precursors (mainly beta-carotene), such as green leaves, carrots, ripe mangos, eggs, and other orange-yellow vegetables and fruits. (WHO, 2009)

Clinical Manifestations

- Xerophthalmia is caused by inadequate function of the lacrimal glands and is manifested by dry eyes, night blindness and Bitot's spots (areas of abnormal squamous cell proliferation and keratinization of the conjunctiva), progressing to corneal xerosis and keratomalacia. The advanced stages of xerophthalmia may be irreversible.
- Poor bone growth
- Non-specific dermatological problems, such as hyperkeratosis, phrynodema (follicular hyperkeratosis), and the destruction of hair follicles and their replacement with mucus-secreting glands.
- Impairment of the humoral and cell mediated immune system via direct and indirect effects on the phagocytes and T cells.

Replacement — Vitamin A deficiency is common among populations in developing countries. For populations in which vitamin A deficiency is endemic, the World Health Organization recommends the following replacement approaches:

Treatment

Vitamin A supplements can be distributed at 4 to 6 month intervals at the following doses:

Infants < 6 months of age

Non breast-fed: 50,000 IU orally

Breast fed:* 50,000 IU orally

*unless the mother has received supplemental vitamin A

Infants 6 to 12 months of age: 100,000 IU orally

Children >12 months of age: 200,000 IU orally

Mothers: 200,000 IU orally, within 8 weeks of delivery

Women who may be pregnant should not be given high-dose supplements because of potential teratogenic effects, but should receive frequent small doses not exceeding 10,000 IU daily or 25,000 IU weekly. This corresponds approximately to the Upper Limit (UL) for adults set by the Food and Nutrition

Board in the United States.

High-dose supplementation — For children at high risk of vitamin A deficiency, such as those with measles, diarrhea, respiratory disease, or severe malnutrition, who live among populations at risk for vitamin A deficiency, and have not received supplements within the past 1 to 4 months, the WHO recommends a single dose of vitamin A at the age-specific dose listed above.

Xerophthalmia — For treatment of xerophthalmia, vitamin A is given in three doses at the age-specific doses listed above. The first dose is given immediately on diagnosis, the second on the following day, and the third dose at least two weeks later. Women of reproductive age or who are pregnant and have night blindness should be treated with frequent small doses of vitamin A. Those with xerophthalmia should be treated with the same high dose schedule as other adults.

VITAMIN E

Vitamin E is found in a variety of foods including oils, meat, eggs, and leafy vegetables. Tocopherol deficiency can be associated with a progressive sensory and motor neuropathy, ataxia, retinal degeneration, and a hemolytic anemia. Because of an abundance of tocopherols in the human diet, vitamin E deficiency is rare except in individuals with pancreatic insufficiency or other conditions causing *substantial fat malabsorption, or protein-energy malnutrition*.

Symptoms

- Hemolysis,
- Neuromuscular disorders
- Ataxia
- Peripheral neuropathy
- Retinal degeneration
- Hemolytic anemia

Treatment

Replacement therapy according to underlying etiology (dynamed, 2009)

- cystic fibrosis - 5-10 units/kg/day orally, monitor serum vitamin E level
- chronic cholestasis - d-alpha-tocopheryl polyethylene glycol 1,000 succinate 15-25 units/kg/day orally, monitor ratio of serum vitamin E level to total serum lipid level, use parenteral vitamin E is inadequate response
- abetalipoproteinemia - 100-200 units/kg/day orally in 2-3 divided doses, monitor adipose tissue content or erythrocyte hydrogen peroxide assay
- short bowel syndrome - 200-3,600 units/day orally or 15 units/day parenterally, monitor serum vitamin E level
- isolated vitamin E deficiency syndrome - 800-3,500 units/day orally, monitor serum vitamin E level

VITAMIN K

Sources of vitamin K--green and yellow vegetables, dairy products phyloquinone.

Symptoms

Deficiency of vitamin K results in a bleeding diathesis. Bleeding may be seen in the skin, the gastrointestinal tract, genitourinary tract, gingiva, lungs, joints, or the central nervous system.

Treatment

- Vitamin K 10-20 mg to correct defect in 8-12 hours, repeat every 12 hours until PT corrected if surgery necessary
- Replace deficient factors (prothrombin complex concentrate), add fresh frozen plasma (FFP) for emergency surgery

WATER SOLUABLE VITAMIN DEFICIENCIES

Deficiencies of water-soluble vitamins are seen with protein-energy malnutrition in developing countries but are less common than are deficiencies of fat-soluble vitamins

THIAMINE - VITAMIN B1 DEFICIENCY

Classically associated with **beriberi**, **characterized by high output cardiomyopathy and polyneuritis**. Infantile beriberi occurs in infants between one and four months of age who have protein-energy malnutrition, are receiving unsupplemented hyperalimentation fluid or boiled milk, or are breast-fed by mothers who are deficient in thiamine. Infants with beriberi have a characteristic hoarseness or aphonic cry caused by laryngeal paralysis.

Signs and Symptoms

- Unremarkable signs and symptoms in mild disease⁽²⁾
- Findings of advanced disease may include⁽²⁾
 - Wernicke-Korsakoff syndrome
 - peripheral neuritis
 - cardiomyopathy
 - Ophthalmoplegia (Orv Hetil 1991 Nov 24;132(47):2627 [Hungarian])
- Findings of cardiac hypertrophy and dilatation in advanced disease⁽²⁾

- Classic picture of high output cardiac failure in wet beriberi may disappear in severe cases with hypotension (Q J Med 1981 Autumn;50(200):359 in Am J Med 1995 May;98(5):485)
- Edema may occur with advanced disease⁽²⁾
- Tenderness of muscles on pressure may occur⁽²⁾
- Alterations in tendon reflexes may occur in mild or subacute cases⁽²⁾
- Encephalopathy with mental changes may vary from trivial to complete Wernicke's encephalopathy⁽²⁾
- Infantile beriberi may include⁽¹⁾
 - seizures
 - mental symptoms
 - opisthotonus (spasm with body in arched position)
 - peripheral neuropathic lesions
 -

(from Physiol Res 1999;48(3):175)

Treatment

In children

- noncritically ill - 10-50 mg/day orally in divided doses
- critically ill (e.g., infantile beriberi) - 10-25 mg intramuscularly or intravenously (IV)

In adults

- noncritically ill - 5-30 mg/day orally, as single dose or 3 divided doses, for 1 month
- critically ill (or patient with malabsorption syndrome) - 5-100 mg intramuscularly or IV 3 times daily
- Wernicke's syndrome - initially 100 mg IV, then 50-100 mg intramuscularly daily until patient can consume a balanced diet
- **beriberi** - 10-20 mg intramuscularly 3 times daily for up to 2 weeks

RIBOFLAVIN - VITAMIN B2 DEFICIENCY

Characterized classically by angular stomatitis, glossitis (magenta tongue), seborrheic dermatitis around the nose and scrotum, and vascularization of the cornea.

NIACIN — VITAMIN B3 DEFICIENCY

Results in pellagra with dermatitis, diarrhea, dementia, and weakness.

Symptoms

- The dermatitis is localized to sun-exposed areas of the body. The skin is dry, cracked, hyperkeratotic, and hyperpigmented.
- Watery diarrhea, as well as colitis, may be pronounced. Vomiting also may occur.
- Neurologic findings include peripheral neuropathy, irritability, headache, insomnia, loss of memory, emotional instability, toxic psychosis associated with delirium and catatonia, seizures, and coma.
- Oral manifestations include cheilosis, angular fissures, atrophy of the tongue, hypertrophy of the fungiform papillae, and painful inflammation of the mouth, which may lead to refusal of food.

Treatment

Dietary Requirements:

ORAL: 14-18MG

Higher dosages required in patients with Hartnup disease, liver cirrhosis, carcinoid syndrome, malabsorption syndrome, or in individuals receiving long-term isoniazid therapy or undergoing hemodialysis or peritoneal dialysis.

PELLAGRA:

Oral: Niacin or niacinamide: 300–500 mg daily in divided doses.^a

HARTNUP DISEASE:

Oral: Niacin: 50–200 mg daily.^a

PYRIDOXINE - VITAMIN B6 DEFICIENCY

Manifests as nonspecific stomatitis, glossitis, cheilosis, irritability, confusion, weight loss, and depression. Peripheral neuropathy occurs in adolescents, whereas younger children develop encephalopathy with seizures. Rule out: vitamin B2 (riboflavin) deficiency. Treatment is inconclusive.

Causes:

- Chronic alcoholism, isoniazid (INH, isonicotinic acid hydrazide), homocystinuria (inborn error of metabolism)

Pathogenesis:

- B6 stored in striated muscle
- pyridoxine-responsive anemia (microcytic)
- theoretically diabetes mellitus - decreased glucose, decreased liver glycogen, decreased insulin, impaired gluconeogenesis, decreased GH, decreased lactate dehydrogenase, degenerative changes in beta cells

B6-deficient mothers may produce mentally retarded infants

VITAMIN B12 DEFICIENCY

Uncommon in children but can occur in exclusively breast-fed infants of vegetarian mothers. Deficiency may cause megaloblastic anemia (Pernicious Anemia), neuropathy, and demyelination of the central nervous system. Irreversible cognitive deficits may occur in the young infants.

Pernicious anemia (megaloblastic): lack of intrinsic factor → insufficient vit B12 absorption in small intestine. Onset is generally after 30 years of age, but can present at birth (congenital) as an inherited form. Commonly caused by vegetarian diet/ malnutrition, autoimmune origin, infection of small intestine.

Treatment

Oral vitamin B12 replacement:

- very large oral doses (1,000 mcg/day) may correct B12 deficiency even in patients with intrinsic factor deficiency.

Synthetic B12 (cyanocobalamin) by injection 1000 mcg intramuscularly every week for 6 weeks then 500-1000 mcg/month indefinitely, patient or caretakers may be taught to provide injections.

(Dynamed, 2009)

MINERAL AND TRACE ELEMENTS DEFICIENCIES

Children with PEM also may be deficient in minerals or trace elements.

IRON

Iron deficiency anemia is the most common nutritional deficiency in children. Usually, it is a mild to moderate microcytic, hypochromic anemia in an otherwise asymptomatic infant or child.

Symptoms

Severe iron deficiency anemia presents: **lethargy, pallor, irritability, cardiomegaly, poor feeding, tachypnea, and impaired psychomotor and mental development. Spooning and pallor of the nail beds may be present on physical examination. Pagophagia, or pica for ice**, is specific for the iron-deficient state. It may be present in children who are not anemic and responds rapidly to treatment with iron, often before any increase is noted in the hemoglobin concentration.

Treatment

Oral dosing (Dynamed, 2009)

Ferrous sulfate, ferrous gluconate and ferrous fumarate have similar efficacy and tolerability for equal doses of elemental iron (Prescriber's Letter 2008 Aug;15(8):47)

For children, oral ferrous sulfate (3 mg/kg/day of elemental iron)

For adults, elemental iron 50-100 mg orally 3 times daily for 3 months approximately 65 mg of elemental iron provided by:

- ferrous fumarate 200 mg
- ferrous sulfate 325 mg
- ferrous gluconate 300mg

ZINC

Zinc deficiency was originally described in a group of children with low levels of zinc in their hair, poor appetite, diminished taste acuity, hypogonadism, and short stature. Clinical manifestations include:

- **Mild** zinc deficiency: depressed immunity, impaired taste and smell, onset of night blindness, and decreased spermatogenesis.
- **Severe** zinc deficiency: severely depressed immune function, frequent infections, bullous pustular dermatitis, diarrhea, and alopecia.

Signs and Symptoms

Alopecia	Impaired concentration
Anorexia	Nystagmus
Abdominal pain	Night blindness
Blepharitis	Nervousness
Corneal opacities	Paronychia
Dysarthria	Pica
Dermatitis	Stomatitis
Depression	Growth retardation
Diarrhea	Hypogonadism
Delayed wound healing	Hypoguesia
Fever	Intention tremor
Glossitis	

Adapted from: Goldschmid, S, Graham, M, Gastroenterol Clin N Am 1989; 18:579.

COPPER

Copper deficiency was first reported in infants recovering from PEM whose diet was based on cow's milk. It is seen also in infants receiving total parenteral nutrition. Copper deficiency is associated with a sideroblastic anemia, neutropenia, failure to thrive, and skeletal abnormalities including osteoporosis, enlargement of costochondral cartilage, cupping and flaring of long bone metaphyses, and spontaneous fractures of the ribs.

IODINE

Moderate iodine deficiency can lead to hyperplasia and hypertrophy of the thyroid gland or goiter to maintain a euthyroid state. Severe dietary iodine deficiency results in hypothyroidism. Hypothyroidism during early critical periods of development can lead to permanent mental retardation, hearing impairment, spastic diplegia, and strabismus.

- Congenital Hypothyroidism can present with hypotonia, macroglossia, hoarseness, growth retardation, and constipation.
- Infants born in regions of iodine deficiency are at risk for some degree of mental retardation. The effects of iodine deficiency can be exacerbated by deficiencies of selenium and vitamin A and the ingestion of foods such as cassava or millet that contain goitrogenic substances.

SAMPLE FORMULARY

Immunizations Available at the Blanchard Clinic

- Measles
- Polio
- DTP
- BCG

Injectable

Lidocaine hcl 1% Injection	Analgesic	10mg/ml
Ceftriaxone Injection	Antibiotic	1 g

Pain

Acetaminophen	80mg/0.8ml drops, 160mg/5ml syrup, 80mg chewable and 500 mg tabs
Excedrin	250mg acetaminophen /250mg aspirin)
Lidocaine 2.5% / Prilocaine 2.5% cream	
Benzocaine 20% (topical)	
Ibuprofen	100 mg/5 ml syrup, 50mg/1.25ml drops, 200mg tabs
Aspirin Enteric Coated	325mg

Antibiotics:

Metronidazole	250 tabs
Amoxicillin	250mg/5ml suspension, 250mg chewable, 500mg tabs
Cefprozil	250 mg
Cefuroxime	7.5 g / bottle
Cephalexin (Keflex)	250mg/5ml suspension, 500mg tabs
Ciprofloxacin	500 mg
Dicloxacillin	250 mg
Doxycycline	100 mg
Nitrofurantoin	50 mg

Penicillin	250 mg/5 ml
SMX/TMP (Septra)	200mg/40mg/5ml suspension, 400mg/80mg tabs
Tetracycline	250 mg
Triple Antibiotic Ointment	1.0gm foil packets

Antiparasitics:

Metronidazole	250 tabs
Albendazole (chewable)	400 mg
Itch be Gone (topical)	

Ivermectin	Albendazole
Ascaris 100%	Ascaris 100%
Strongyloides 95%	Strongyloides 45%
Enterobius 85%	Enterobius 85%
Trichuris 10-50%	Trichuris 40-60%
Hookworm 0-20%	Hookworm* 40%-95%
Larva migrans 100%	Larva migrans 80%
Onchocercias 95%	
Lice 100%	
Scabies 100%	
	Cysticercosis*/Hydatids* / Giardia*/Trichomonads* / Microsporidia* *Requires more than 1 dose

Antimalarials:

Chloroquine	250 mg
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Antifungals:

Fluconazole	200 mg
Griseofulvin	500 mg
Miconazole 2% cream	15 g/tube

Asthma

Albuterol	4 mg
Albuterol Sulfate Inhalation Solution (for nebulizer)	2.5 mg/3 ml
Albuterol Sulfate Syrup	2 mg/5 ml
Atrovent	
Asmanex (inhaler)	

Antihistamine and Cold Medications

Diphenhydramine (Benadryl)	12.5mg/5ml syrup, 25 mg tab, 50mg tab
Benadryl (allergy & sinus)	325mg tylenol/12.5mg diphenhydramine/5mg psuedoephedrine
Triaminic	6.25mg/2.5mg / 5ml

GI

Calcium Carbonate (TUMS)	750 mg, 1000mg
Maalox Advanced (liquid)	Liquid and tabs
Mylanta	
Titrilac plus (Calcium Carbonate)	
Ranitidine	150 mg
Omeprazole	20 mg
Oral rehydraton salts	
Bismuth Subsalicylate liquid	262 mg/15 ml

Hypertension

Atenolol	100 mg
Hydrochlorothiazide (HCTZ)	25 mg
Methyldopa	500 mg

Ophthalmic

Gentamicin Ophthalmic Solution	
Sulfacetamide ophtalmic solution	

Steroids

Prednisone	10 mg
Betamethasone Valerate (cream)	

Topical

Triple Antibiotic Ointment	1gm foil packets
Silver Sulfadiazine (cream)	
Miconazole 2% cream	15 g/tube
Itch be Gone (?lindane)	
Lidocaine 2.5% / Prilocaine 2.5% cream	
Benzocaine 20%	
Betamethasone Valerate (cream)	
Carmol 40 (40% urea) - emollient	

Nutritional Supplements

Ferrous sulfate	325 mg
Multivitamins (prenatal) Fe+	
Multivitamins (drops)	1 ml/dose
Multivitamins (adult)	
Multivitamins/fe+ (Chewable)	
Vitamin A (200,000 IU)	

APPENDIX 1 - LABORATORY TESTS AVAILABLE

Location	Hb/Hct	Glucose	Pathology	Microscopy	Pregnancy	Urine (UA)
Leogane	x	x			x	x
Blanchard	x	x	x		x	x
Fondwa	x	x			x	x

- Microscopy may be available in the future to teams but provider will need to perform the test.
- Xray - Croix des Missions, Grace Children's Hospital (cost \$70-100 Haitian)
- Ultrasound - hospitals
- CT - some private hospitals but very high cost
- Blanchard clinic can also do
 - HIV
 - Tine test (TB)
 - Sickie test
 - Blood type
 - RPR
 - Widal
 - Microscopy

APPENDIX 2 – REFERRAL LOCATIONS

TB treatment

- Government Health Centers
- Sanatorium in PAP
- Croix des Missions
- Grace Children's Hospital
- St. Catherines (Cite Soleil)
- Shapi (Cite Soleil)

HIV testing or treatment

- GHESKIO in Port Au Prince (33 Blvd Harry Truman, PAP 222-0031 or 222-2241)
- Croix des Missions

Leprosy treatment

- multidrug treatment is offered for free through WHO from Narvartis
- Providence Hospital in Gonaives (Artibonite)
- Fame Pereo Institute in Port-au-Prince

Hospital with surgical capabilities

- General Hospital
- La Pere Hospital on Delmas 33 (private)
- Private clinics

Hospital with pediatric capabilities

- General Hospital
- St. Damian (Petion-ville, Tabarre near airport)

Ob/Gyn

- St. Catherine's
- Chancerelles
- General Hospital
- Ofatma (1/2 private, 1/2 public)
- Bellaime Bernard Mevs (private)

Nutrition Programs

- Children's Nutrition Program (CNP)

APPENDIX 3 – SLIDE PREPARATION & IDENTIFICATION OF ORGANISMS

(technical information from Medical Chemical Corporation website 7/21/2009)

Preparing Blood Smears to look for/at RBC, WBC, malaria

If you are using venous blood, blood smears should be prepared as soon as possible after collection (delay can result in changes in parasite morphology and staining characteristics).

Thick smears

Thick smears consist of a thick layer of dehemoglobinized (lysed) red blood cells (RBCs). The blood elements (including parasites, if any) are more concentrated (app. 30×) than in an equal area of a thin smear. Thus, thick smears allow a more efficient detection of parasites (increased sensitivity). However, they do not permit an optimal review of parasite morphology. For example, they are often not adequate for species identification of malaria parasites: if the thick smear is positive for malaria parasites, the thin smear should be used for species identification.

Prepare at least 2 smears per patient!

1. Place a small drop of blood in the center of the pre-cleaned, labeled slide.
2. Using the corner of another slide or an applicator stick, spread the drop in a circular pattern until it is the size of a dime (1.5 cm²).
3. A thick smear of proper density is one which, if placed (wet) over newsprint, allows you to barely read the words.
4. Lay the slides flat and allow the smears to dry thoroughly (protect from dust and insects!). Insufficiently dried smears (and/or smears that are too thick) can detach from the slides during staining. The risk is increased in smears made with anticoagulated blood. At room temperature, drying can take several hours; 30 minutes is the minimum; in the latter case, handle the smear very delicately during staining. You can accelerate the drying by using a fan or hair dryer (use cool setting). Protect thick smears from hot environments to prevent heat-fixing the smear.
5. Do not fix thick smears with methanol or heat. If there will be a delay in staining smears, dip the thick smear briefly in water to hemolyse the RBCs.

Thin smears

Thin smears consist of blood spread in a layer such that the thickness decreases progressively toward the feathered edge. In the feathered edge, the cells should be in a monolayer, not touching one another.

Prepare at least 2 smears per patient!

1. Place a small drop of blood on the pre-cleaned, labeled slide, near its frosted end.
2. Bring another slide at a 30-45° angle up to the drop, allowing the drop to spread along the contact line of the 2 slides.
3. Quickly push the upper (spreader) slide toward the unfrosted end of the lower slide.
4. Make sure that the smears have a good feathered edge. This is achieved by using the correct amount of blood and spreading technique.
5. Allow the thin smears to dry. (They dry much faster than the thick smears, and are less subject to detachment because they will be fixed.)
6. Fix the smears by dipping them in absolute methanol.

Note: Under field conditions, where slides are scarce, national malaria programs (and CDC staff) prepare both a thick and a thin smear on the same slide. This works adequately if one makes sure that of the two smears, only the thin smear is fixed.

A. Wear gloves when performing this procedure.

B. Thin blood films (only)

1. Fix air-dried film in absolute methanol by dipping the film briefly (two dips) in a Coplin jar containing absolute methanol.
2. Remove and let air dry.
3. Stain with diluted Giemsa stain (1:20, vol/vol) for 20 min. For a 1:20 dilution, add 2 ml of stock Giemsa to 40 ml of buffered water in a Coplin jar.
4. Wash by briefly dipping the slide in and out of a Coplin jar of buffered water (one or two dips). Note: Excessive washing will decolorize the film.
5. Let air dry in a vertical position.

C. Thick blood films (only)

1. Allow film to air dry thoroughly for several hours or overnight. Do not dry films in an incubator or by heat, because this will fix the blood and interfere with the lysing of the RBCs. Note: If a rapid diagnosis of malaria is needed, thick films can be made slightly thinner than usual, allowed to dry for 1 h, and then stained.

2. DO NOT FIX.
3. Stain with diluted Giemsa stain (1:50, vol/vol) for 50 min. For a 1:50 dilution, add 1 ml of stock Giemsa to 50 ml of buffered water in a Coplin jar.
4. Wash by placing film in buffered water for 3 to 5 min.
5. Let air dry in a vertical position.

D. Thin and thick blood films on the same slide

1. Allow the thick film to air dry thoroughly
2. Fix air-dried film in absolute methanol by dipping the film briefly (two dips) in a Coplin jar containing absolute methanol. Be sure not to get the alcohol or its fumes on the thick film by slightly tilting the slide.
3. Remove and let air dry with the *thick film up*. Be sure slide is thoroughly dry before staining. Introducing even a minute amount of methyl alcohol into the stain dilution will interfere with the lysing of the RBCs in the thick films.
4. Stain the entire slide with diluted Giemsa stain (1:50, vol/vol) for 50 min. For a 1:50 dilution, add 2 ml of stock Giemsa to 40 ml of buffered water in a Coplin jar. Place the slide in the stain, *thick film down* to prevent the debris caused by dehemoglobinization from falling onto the thin film.
5. Rinse the thin film by briefly dipping the film in and out of a Coplin jar of buffered water (one or two dips). Wash the thick film for 3 to 5 min. Be sure that the thick film is immersed but do not allow the water to cover any part of the thin film.
6. Let air dry in a vertical position with the *thick film down*.

E. Combination thin and thick blood films on the same slide

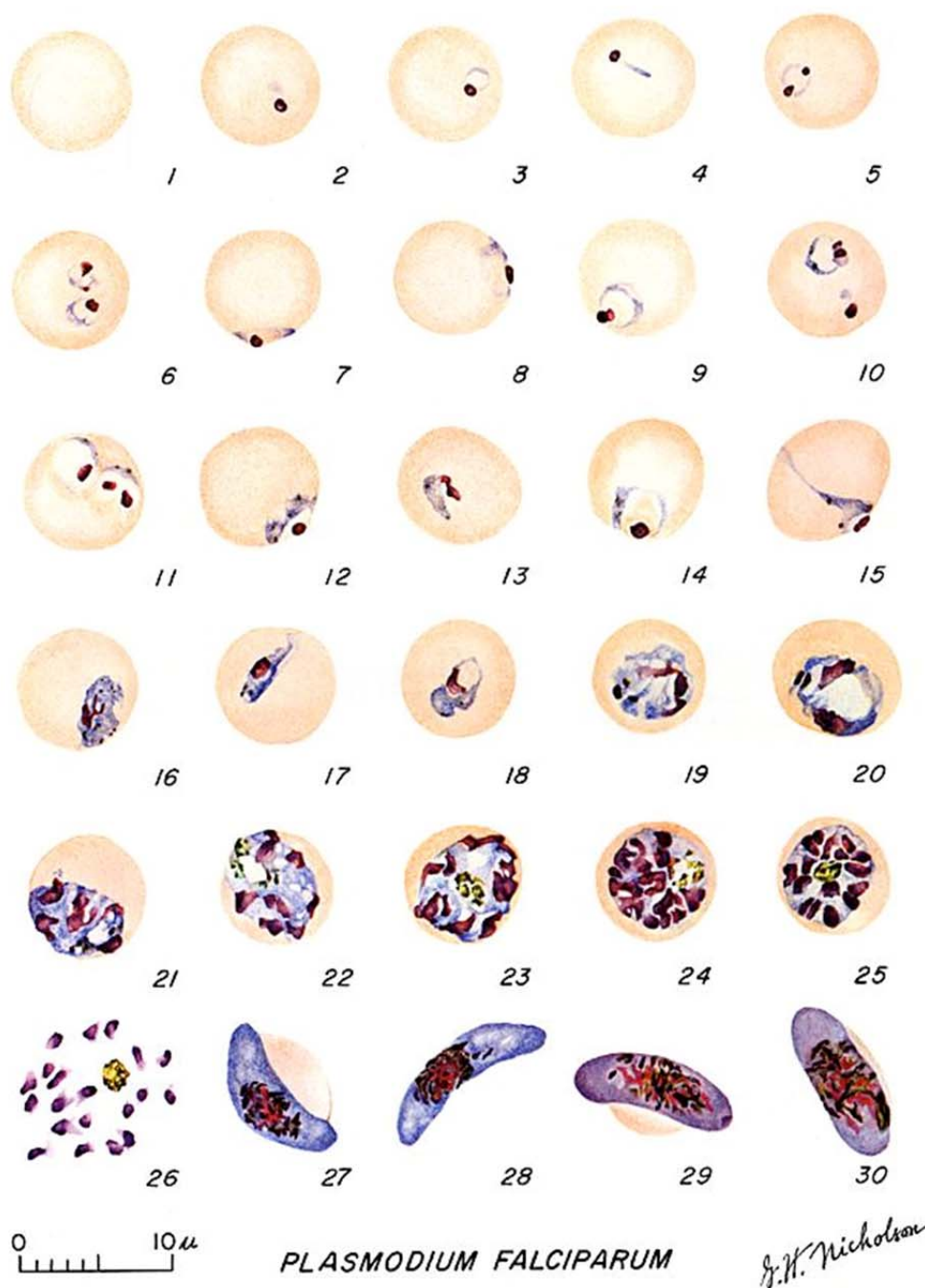
1. Place a clean 1- by 3-in. glass microscope slide on a horizontal surface.
2. Place a drop (30 to 40 µl) of blood onto one end of the slide about 0.5 in. from the end
3. Using an applicator stick lying across the glass slide and keeping the applicator in contact with the blood and glass, rotate (do not “roll”) the stick in a circular motion while moving the stick down the glass slide to the opposite end.
4. The appearance of the blood smear should be alternate thick and thin areas of blood that cover the entire slide.
5. Immediately place the film over some small print and be sure that the print is just 3 Garcia (Giemsa Stain) barely readable.
6. Allow the film to air dry horizontally and protected from dust for at least 30 min to 1 h. Do not attempt to speed the drying process by applying any type of heat, because the heat will fix the RBCs and they subsequently will not lyse in the staining process.

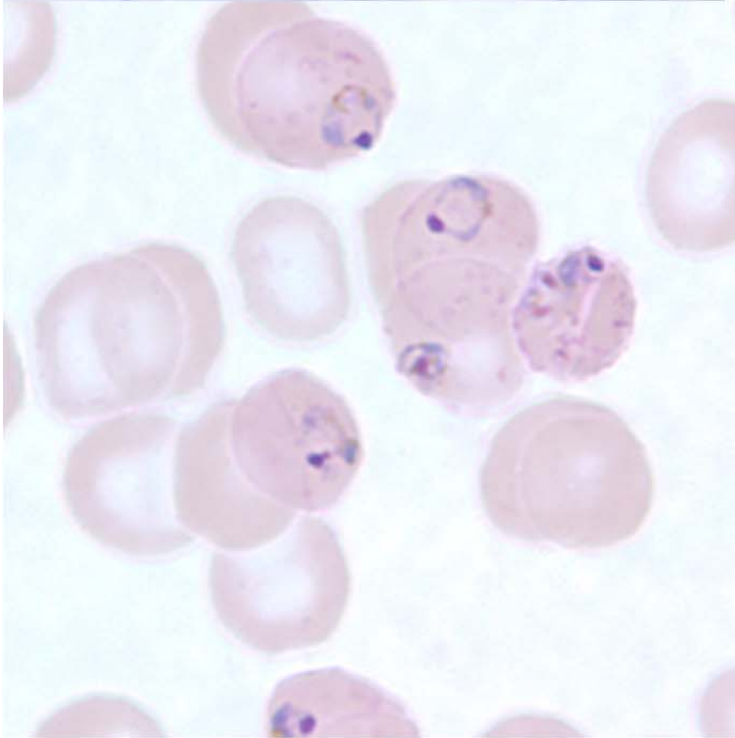
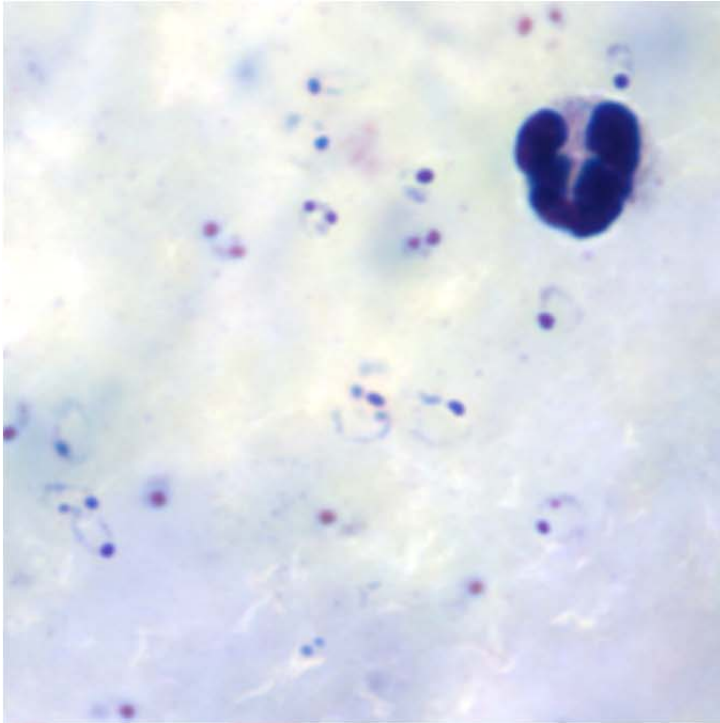
7. This slide can be stained as either a thick or thin blood film.
8. Label the slide appropriately.
9. If staining with Giemsa (as a thick film) will be delayed for more than 3 days or if the film will be stained with Wright's stain, lyse the RBCs on the thick film by placing the slide in buffered water (pH 7.0 to 7.2) for 10 min, remove it from the water, and place it in a vertical position to air dry.
10. If staining with Giemsa (as a thin film), after the film is completely dry, fix it by dipping the slide into absolute methanol, and allow the film to air dry in a vertical position. If the film will be stained with Wright's stain, it does not need to be fixed.
11. Wright's stain contains the fixative and stain in one solution.

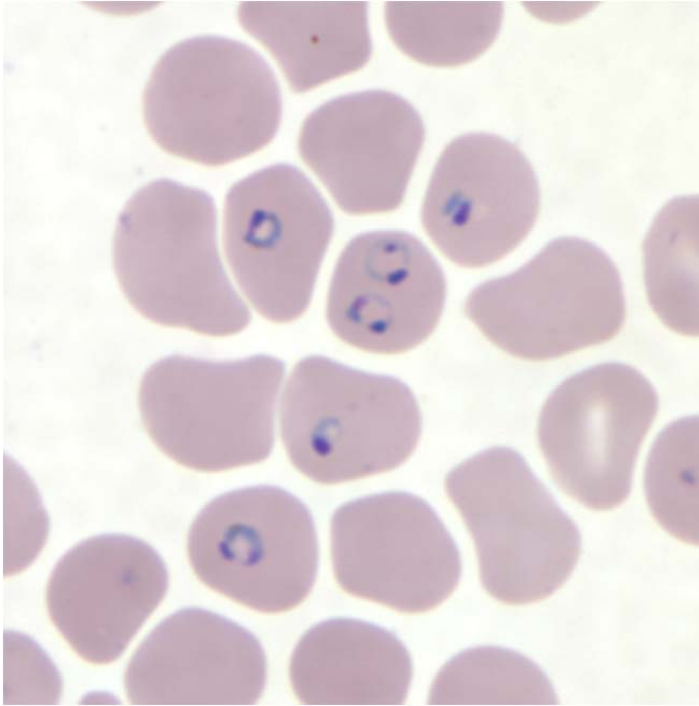
VI. Results

- A. If *Plasmodium* organisms are present, the cytoplasm stains blue and the nuclear material stains red to purple.
- B. Schuffner's stippling and other inclusions in the RBCs infected by *Plasmodium* spp. stain red.
- C. Nuclear and Cytoplasmic colors that are seen in the malarial parasites will also be seen in the trypanosomes and any intracellular leishmaniae that are present.
- D. The sheath of microfilariae may or may not stain with Giemsa, while the body will usually appear blue to purple

Plasmodium Falciparum: Blood Stage







TB Slide Preparation (Acid Fast)



Acid Fast Stain of Mycobacterium tuberculosis “red snappers”

ZIEHL-NEELSON ACID FAST STAINING

Reagent

Z-N Carbol Fuchsin

Acid Alcohol Decolorizer

Methylene Blue 1%

Brilliant Green 1%

SPECIMEN COLLECTION

Organisms being stained by an acid fast method are usually taken from a solid or liquid medium on (in) which they have been cultured from their original source (e.g. wounds, throat, swabs, sputum, etc.). An aqueous suspension is made, in the case of the solid medium, by taking a small amount of the material and suspending it in a drop of distilled water on a microscope slide. Care should be taken not to make the smear too thick. In the case of a liquid medium, a drop is used directly from the culture container. However, due to the solids from the medium, this method is not always satisfactory. The suspension made by either method is air dried, then "fixed" by passing rapidly through a Bunsen burner flame two or three times. Allow the smear to cool before staining.

PROCEDURE

1. Place the "fixed" smear on a staining rack and flood slide with Ziehl-Neelson stain. Heat underside of slide for 3 minutes. Do not allow stain to boil.
2. Wash off the stain with distilled water.
3. Decolorize with acid alcohol until no more color runs from the smear.
4. Rinse thoroughly with distilled water.
5. Flood slide with methylene blue or brilliant green for 1-2 minutes.
6. Rinse thoroughly with distilled water and air dry.
7. Examine under high dry magnification and verify under oil immersion.

Note: Staining times may vary to suit the individual.

SOURCES OF ERROR

1. Overheating (burning) during fixation can be avoided by just touching the back of the slide to the back of the hand each time the slide has been passed through the flame.
2. Do not stain smears which have only been air dried. Smears must also be "fixed".
3. Smears should not be too thick. After air drying, examine under a microscope. If there are no areas of bacteria separation, more water should be added to dilute the smear.
4. After staining it is essential that the back surface of the slide is wiped clean.

5. If washing with distilled water is not done adequately, crystallization of the stain may appear on the slide.

Gram Stain

INTRODUCTION

The gram stain permits the separation of all bacterial species into two large groups, those which retain the primary dye (gram-positive), and those which lose the primary dye and take the color of the secondary dye (gram-negative). The mechanism of gram stain is based on the distinctive chemistry and physical properties of the cell wall, possibly the lipid content. However, the exact mechanism of gram stain is still unknown.

Reagents

Crystal Violet

Grams Iodine

Stabilized Gram's Iodine

Grams Decolorizer

Safranin*

*The safranin counter stain may be substituted with basic fuchsin counter stain catalog # 435A for better Anaerobe staining.

SPECIMEN COLLECTION

Organisms being stained by the gram method are usually taken from a solid or liquid medium on (in) which they have been cultured from their original source (e.g. wounds, throat, swabs, sputum, etc.). An aqueous suspension is made, in the case of the solid medium, by taking a small amount of the material and suspending it in a drop of distilled water on a microscope slide. Care should be taken not to make the smear too thick. In the case of a liquid medium, a drop is used directly from the culture container. However, due to the solids from the medium, this method is not always satisfactory. The suspension made by either method is air dried, then "fixed" by passing rapidly through a Bunsen burner flame two or three times. Allow the smear to cool before staining.

PROCEDURE

1. Place the "fixed" smear on a staining rack and cover completely with crystal violet for 30-60 seconds.
2. Wash off the stain with distilled water.
3. Cover the slide with iodine for 30 seconds.

4. Wash off with distilled water.
5. Decolorize with Gram decolorizer for 10-15 seconds.
6. Wash thoroughly with distilled water.
7. Cover completely with safranin for 30-60 seconds.
8. Wash with distilled water and air dry. Examine under immersion oil.

Note: Staining times may vary to suit the individual.

SOURCES OF ERROR

1. Overheating (burning) during fixation can be avoided by just touching the back of the slide to the back of the hand each time the slide has been passed through the flame.
2. Do not stain smears which have only been air dried. Smears must also be "fixed".
3. Smears should not be too thick. After air drying, examine under a microscope. If there are no areas of bacteria separation, more water should be added to dilute the smear.
4. After staining it is essential that the back surface of the slide is wiped clean.
5. If washing with distilled water is not done adequately, crystallization of the stain may appear on the slide.

Blood Smear

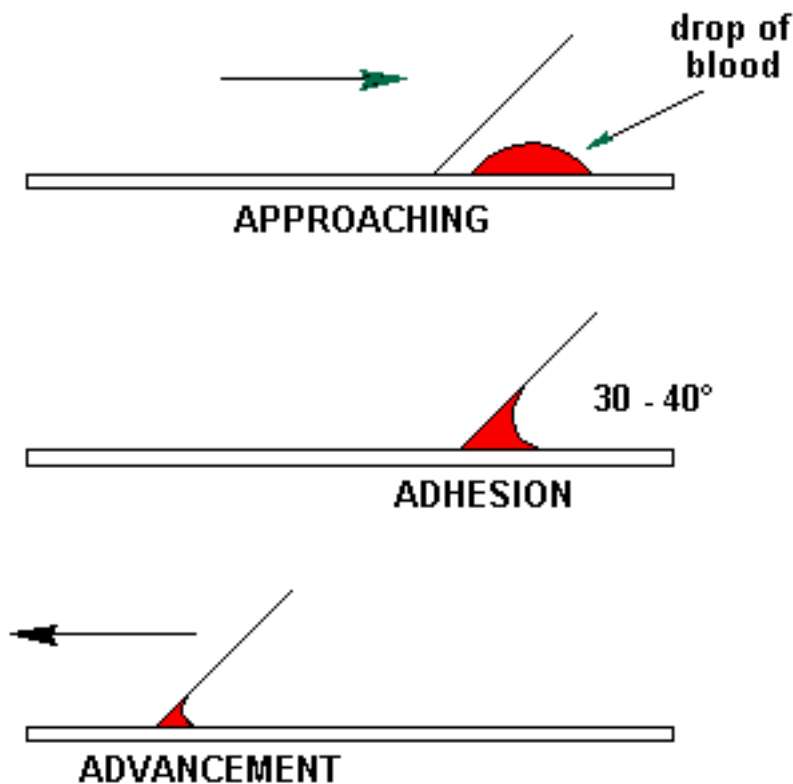


Fig. 7 - How to prepare a blood smear

1. Place a small drop of blood near an end of a slide.
2. According to figure 7, bring the edge of another slide in contact with the drop and allow the drop to bank evenly behind the spreader. The angle between the two slides has to be 30-40 degrees. Now, push to the left in a smooth, quick motion. The smear should cover about half the slide.
3. It is important that the quantity of blood is not excessive, otherwise the red cells could hide the leukocytes. So, if you succeed in making a gradual transition from thick to thin in your smear, you should get a zone with a satisfactory distribution of cells.
4. With a single drop of blood, you can make several smears. In fact, to make a smear, it is enough to leave a spot of blood of 3 mm about in diameter on the slide. It is useful to perform many smears. In fact, not always they are successful, and with some attempts, it is easier to get one well prepared.

5. To avoid producing clots, you must make each smear with fresh blood and straight after having deposited it. To this purpose, it is useful to be helped by another person where one deposits the blood, and the other makes the smears.
6. With the microscope, you should observe the smears to check that some of them are properly made. The red cells must not overlap each other, nor be so scarce as to be too spread out.

Stool Wet Mount

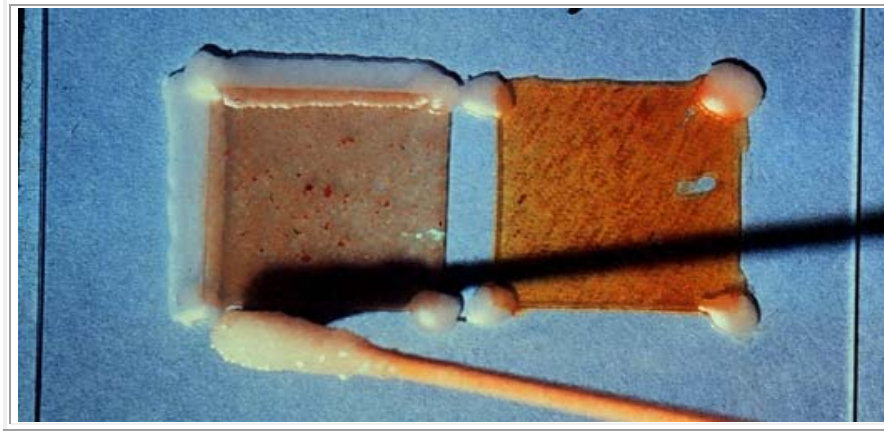
(from http://www.dpd.cdc.gov/dpdx/html/frames/diagnosticprocedures/body_dp_stoolexamin.htm)

Protozoan trophozoites, cysts, oocysts, and helminth eggs and larvae may be seen and identified using a wet mount identification technique. To prepare a wet mount, obtain a microscope slide and the stool specimen. Take a small amount of the specimen and place it on a microscope slide. If the stool specimen is still somewhat solid, add a drop or two of saline to the specimen and mix. Ideally, two smears can be prepared on one slide, of which one can be stained with iodine.

Thickness of the wet mount should be as the image below illustrates.



If desired the coverslip(s) can be sealed. A preparation of petroleum jelly and paraffin in a 1:1 ratio can be applied with a cotton tip swab as illustrated. It must be heated to approximately 70°C to both mix and use. Sealing the coverslip keeps organisms from moving when using oil immersion objectives and prevents the preparation from drying out. To seal, secure the four corners by placing a drop of hot sealant to anchor the coverslip. Spread a thin layer around the edges. Other suitable sealing preparations can be used if desired.



Systematically scan the entire coverslip area using the 10× objective as illustrated. If something suspicious is seen, a higher magnification may be necessary.



CAUTION: Bringing high power objectives too near the edge of the slide will result in the sealant smearing the objective and interfering with the optics.

Stained Slide Preparation:

Permanent stained slides are used for identification of protozoan trophozoites and cysts and for confirmation of species. It also permits consultation reference and diagnosis when needed as well as providing a permanent record of organism(s) observed. The microscope should be calibrated before examination begins. Positive microscope slides as well as reference material (plates, photographs, digital images) should be available by the workstation to compare morphological details and organisms. Refer to the staining section of stools for additional information regarding which stains to use.

Normally 3 × 1 slides are used to prepare permanent stained slides. If the specimen is unpreserved, prepare a thin even smear of the material by streaking the material back and forth on the slide with an applicator stick. If necessary dilute feces with saline. For PVA fixed specimens, apply two or three drops of the specimen to the slide and with a rolling motion or an up and down dabbing motion spread the specimen evenly to cover an area roughly the size of a 22 by 22 mm coverslip. For other fixatives, check manufacturers instructions.

After the staining process is complete, systematically examine the smear microscopically utilizing the 100× oil objective. Examine at least 200 to 300 oil immersion fields. Report protozoa seen as either trophozoites and/or cysts as applicable.

APPENDIX 4 - VITAMIN A DEFICIENCY & SUPPLEMENTATION

- Vitamin A deficiency ranges from 11 to 40% among young children in developing nations. Vitamin A deficiency increases the mortality associated with diarrheal diseases.
- Large-scale vitamin A supplementation was found to lead to a 32% decrease in diarrhea-specific mortality.
- It reduced overall mortality for children 6 months to 5 years of age by 23%.
- Supplementing with vitamin A leads to less severe diarrhea and may reduce the number of episodes of diarrhea in children.
- Vitamin A deficiency is the leading cause of preventable blindness in children.
- In pregnant women VAD causes night blindness and may increase the risk of maternal mortality.
- Vitamin A deficiency increases death from measles.

Haiti

71% coverage rate of 1 dose of vitamin A in 2008 and 61% in 2007.

Infant mortality increased from 73.8 per 1,000 live births in 1996 to 80.3 in 2000.

Acute diarrheal disease is the number-one health problem in children. The leading causes of death in 1999 were intestinal infectious diseases (12.1%), infections of the perinatal period (10.2%), malnutrition (9.1%) and acute respiratory infections (6.9%).

Supplementation

Current *WHO recommendations* are for children between 6 and 59 months receive High Dose Vitamin A supplementation at least 2 times a year. In order to reach the children between birth and 6 months, nursing mothers should be given 1 high dose vitamin supplement ideally at first postpartum visit.

High-dose vitamin A should be avoided during pregnancy because of the theoretical risk of teratogenesis (birth defects).

High-dose vitamin A supplementation can be provided safely to all postpartum mothers within six weeks of delivery, when the chance of pregnancy is remote. For breastfeeding mothers, the safe infertile period extends up to eight weeks after delivery. The first contact with the infant immunization services provides an

excellent opportunity to supplement postpartum mothers and improve the vitamin A content of their breast milk.

Target group	Immunization contact	Vitamin A dose
All mothers irrespective of their mode of infant feeding up to six weeks postpartum if they have not received vitamin A supplementation after delivery	BCG, OPV-0 or DTP-1 contact up to six weeks	200 000 IU
Infants aged 9–11 months Children aged 12 months and older	Measles vaccine contact	100 000 IU 200 000 IU
Children aged 1–4 years	Booster doses* Special campaigns* Delayed primary immunization doses*	200 000 IU

* The optimal interval between doses is four to six months. A dose should not be given too soon after a previous dose of vitamin A supplement: the minimum recommended interval between doses for the prevention of vitamin A deficiency is one month (*the interval can be reduced in order to treat clinical vitamin A deficiency and measles cases*).

APPENDIX 5 – IMMUNIZATION SCHEDULE

Vaccine	First Dose	Second Dose (interval from 1 st)	Additional doses interval	Notes
BCG	As soon as possible after birth			Not in HIV+
Measles	9-15 months	4 weeks min (can be 4-6 years old)		
Polio	6 weeks	4 weeks min.	4 weeks	
DTP	6 weeks	4 weeks min	4 weeks	Booster 1-6 yrs, adolescents, and adult
Hepatitis B	Birth or 6 wks	4 weeks if bivalent, 2 months if quadrivalent	5 months if bivalent, 4 months if quadrivalent	3 to 4 doses depending on if birth dose
Pneumococcal	6 weeks	4 weeks min.	4 weeks min.	

HPV is also recommended by WHO, 3 doses

Pregnant woman should have DTP booster

1

APPENDIX 6 – MOSQUITO BORNE DISEASE CONTROL

Routine use of bed nets can decrease:

- All cause mortality by 20% in highly endemic malaria regions
- Reduce malaria cases by 50%
- Proven effective in decreasing LF and Dengue transmission as well.
- All adults and children should be targeted though those at highest risk for death from Malaria and Dengue are priority: children and pregnant women.
- If >60% of all adults and children are covered with a bed net, community wide benefit is seen in reduction of malaria and other mosquito borne diseases.

Bed Net and/or Curtain Use

- Bed nets can be bought on the local market for about ---- and may be available through the Neglected Tropical Disease Elimination Campaign (CDC, Carter Center, Ministry of Health) in the near future.
- Long-lasting Insecticide Treated Bed Nets (LLIN) have an insecticide inbedded in the net that lasts for at least 3 years and between 20 and 30 washes depending on the company. Insecticide treated nets are available for \$5 US internationally (Nothing But Nets – NGO) and are the most cost effective mosquito control recommended by the WHO.
- There is also another form of the LLIN that is sold as curtains to be put up to cover doorways and windows and decreases not just nocturnal bites but bites all day, this can be particularly helpful where mosquitos bite not only at night.

Lymphatic Filariasis Elimination Campaign

- Strategy is to interrupt transmission of infection through mass drug administration (MDA) campaigns two times a year, giving albendazole and DEC
- Has been active in Haiti for more than 5 years but has not seen change in transmission.
- Change in strategy is being currently made: need to increase compliance with MDA (above the 70% currently) and do vector control through bed nets.

Please support the work of the campaign to eliminate the NTD (Neglected Tropical Diseases) and the GAELF (Global Alliance to Eliminate Lymphatic Filariasis) by encouraging your patients to participate in the MDA days and use bed nets.

APPENDIX 7 – SAFE DRINKING WATER

Those without improved drinking water need to use:

Boiling :

Difficult because of limited amounts of fuel in Haiti

Water should be boiled for at least 3 minutes and it should be covered while cooling, it should be filtered before boiling if it is cloudy

Chlorination:

- Probably the most cost effective for individual families
 - CNP (children's nutrition program) is using specially designed drinking bucked and locally made chlorine solution to increase access to clean water for individual families
1. Water should be filtered first through clothes/coffee filters/water filters.
 2. Let is sit after filtering to allow sediment to settle, ten pour off clean water into another container, leaving sediment behind.
 3. Add non-scented bleach (look at chlorine concentration on label)
 - 1% 10 drops per quart or liter, 40 per gallon
 - 4-6% 2 drops per quart or liter, 8 per gallon
 - 7-10% 1 drop per quart or liter, 4 per gallon

The amount of chlorine should be doubled for murky, cloudy or extremely cold water.

4. Stir and let stand for 30 minutes, recheck make sure has slight smell. If too strong let it sit longer, if no smell repeat chlorination and sitting.
5. Transfer to a clean container with lid until needed.

Sand Filters:

Work well but may be too expensive for individual families to purchase (\$40 US one time cost, lasts many years)

Other:

Improved drinking water sources are being provided by rehabilitating old wells and making new wells is being done by Living Water and other organizations throughout Leogane and other areas.

APPENDIX 8 – CERVICAL CANCER SCREENING AND TREATMENT BY FHM

- HPV prevalence is 20%
- Cervical cancer prevalence is 5%
- FHM recommends all women between ages 30 and 50 have annual paps.
- FHM offers pap smears and HPV testing (in some circumstances) through Leogane and Blanchard clinic.
- FHM clinics and local Hospitals have ability to do colposcopy and cryotherapy.
- FHM offers their services at reduced cost. Paps at private clinics and hospitals are about \$80 Haitian.
- Patient education materials are available including a brochure and video in Kreyol.

APPENDIX 9 – NUTRITION SUPPLEMENTS FOR CHILDREN AND TREATMENT GUIDELINES FOR MALNUTRITION

- 65-70% of children in Leogane are malnourished (from CNP)
- Peanut butter is provided at Fondwa for malnourished children.
- Children's Nutrition Program (CNP):
 - Peanut butter based supplement "Medika Mamba" or "peanut medicine" is used to treat severely malnourished children (peanut base with vitamins and minerals in correct balance for malnourished children to digest and improve)
 - Uses positive-deviation to improve nutrition, "Ti Foye" program
 - Microcredit opportunities in partnership with Fonkoze Bank for mother's who graduate from the "Ti Foye" program
 - It is based in Leogane but is available to women in other communities
- Other resources: Patient education materials on childhood nutrition

IN-Patient Malnutrition Guidelines⁸

Physiologic basis for treatment of severe malnutrition		
Affected organ or system	Effects	Treatment
Cardiovascular system	Cardiac output and stroke volume are reduced Infusion of saline may cause an increase in venous pressure Any increase in blood volume can easily produce acute heart failure; any decrease will further compromise tissue perfusion Blood pressure is low Renal perfusion and circulation time are reduced Plasma volume is usually	If the child appears dehydrated, give ReSoMal or F-75 diet; do not give fluids intravenously unless the child is in shock Restrict blood transfusion to 10ml/kg and give a diuretic

	normal and red cell volume is reduced	
Liver	<p>Synthesis of all proteins is reduced</p> <p>Abnormal metabolites of amino acids are produced</p> <p>Capacity of liver to take up, metabolize and excrete toxins is severely reduced</p> <p>Energy production from substrates such as galactose and fructose is much slower than normal</p> <p>Gluconeogenesis is reduced, which increases the risk of hypoglycaemia during infection</p> <p>Bile secretion is reduced</p>	<p>Do not give the child large meals</p> <p>Ensure that the amount of protein given does not exceed the metabolic capacity of the liver, but is sufficient to support synthesis of proteins (1-2 g/kg per day)</p> <p>Reduce the dosage of drugs that depend on hepatic disposal or are hepatotoxic</p> <p>Ensure that sufficient carbohydrate is given to avoid the need for gluconeogenesis</p> <p>Do not give iron supplements, which may be dangerous because transferrin levels are reduced</p>
Genitourinary system	<p>Glomerular filtration is reduced</p> <p>Capacity of kidney to excrete excess acid or a water load is greatly reduced</p> <p>Urinary phosphate output is low</p> <p>Sodium excretion is reduced</p> <p>Urinary tract infection is common</p>	<p>Prevent further tissue breakdown by treating any infections and providing adequate energy (80-100 kcal/kg or 336-420 kJ/kg per day)</p> <p>Do not give the child more protein than is required to maintain tissues</p> <p>Ensure that high-quality proteins are given, with balanced amino acids</p> <p>Avoid nutrients that give an acid load, such as magnesium chloride</p> <p>Restrict dietary sodium</p> <p>Ensure that water intake is sufficient but not excessive</p>
Gastrointestinal system	<p>Production of gastric acid is reduced</p> <p>Intestinal motility is reduced</p> <p>Pancreas is atrophied and production of digestive enzymes is reduced</p> <p>Small intestinal mucosa is</p>	<p>Give the child small, frequent feeds</p> <p>If absorption is poor, increase the frequency and reduce the size of each feed</p> <p>If there is malabsorption of fat, treatment with pancreatic</p>

	atrophied; activities of digestive enzymes are reduced Absorption of nutrients is reduced when large amounts of food are eaten	enzymes may be useful
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Physiologic basis for treatment of severe malnutrition

Affected organ or system	Effects	Treatment
Immune system	All aspects of immunity are diminished Lymph glands, tonsils and the thymus are atrophied Cell-mediated (T-cell) immunity is severely depressed IgA levels in secretions are reduced Complement components are low Phagocytes do not kill ingested bacteria efficiently Tissue damage does not result in inflammation or migration of white cells to the affected area Acute phase immune response is diminished Typical signs of infection, such as an increased white cell count and fever, are frequently absent Hypoglycaemia and hypothermia are both signs of severe infection and are usually associated with septic shock	<i>Treat all children with broad-spectrum antimicrobials</i> <i>Because of the risk of transmission of infection, ensure that newly admitted children are kept apart from children who are recovering from infection</i>
Endocrine system	Insulin levels are reduced and the child has impaired	<i>Give the child small, frequent feeds</i> <i>Do not give steroids</i>

	glucose tolerance Insulin growth factor 1 (IGF-1) levels are reduced, although growth hormone levels are increased Cortisol levels are usually increased	
Circulatory system	Basic metabolic rate is reduced by about 30 percent Energy expenditure due to activity is very low	<i>Keep the child warm to prevent hypothermia; dry the child quickly and properly after washing and cover with clothes and blankets, ensure that windows are kept closed at night and keep the temperature of the living environment at 25-30 °C</i>
	Both heat generation and heat loss are impaired; the child becomes hypothermic in a cold environment and hyperthermic in a hot environment	<i>If a child has fever, cool the child by sponging with tepid (not cold) water (never alcohol rubs)</i>
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Physiologic basis for treatment of severe malnutrition

Affected organ or system	Effects	Treatment
Cellular function	Sodium pump activity is reduced and cell membranes are more permeable than normal, which leads to an increase in intracellular sodium and a decrease in intracellular potassium and magnesium Protein synthesis is reduced	<i>Give large doses of potassium and magnesium to all children Restrict sodium intake</i>
Skin, muscles and glands	The skin and subcutaneous fat are atrophied, which leads to loose folds of skin Many signs of dehydration are unreliable; eyes may be sunken because of loss of subcutaneous fat in the orbit Many glands, including the sweat, tear and salivary glands, are atrophied; the child has dryness of the mouth and eyes and sweat production is reduced	<i>Rehydrate the child with ReSoMal or F-75 diet</i>

	Respiratory muscles are easily fatigued; the child is lacking in energy	
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TREATMENT OVERVIEW:

TWO PHASES FOR IN-PATIENT TREATMENT OF SEVERELY MALNOURISHED CHILD

- stabilization phase
 - treatment during first 7 days
 - intravenous fluids for patients with signs of shock
 - choices of IV fluids include
 - Ringer's lactate with 5% glucose
 - 0.5% saline with 5% glucose
 - half-strength Darrow's solution with 5% glucose
 - 15 mg/kg intravenous fluid given over 1 hour
 - repeat if child improves
 - if child doesn't improve, consider diagnosis of septic shock
 - oral rehydration appropriate for children with dehydration and diarrhea (severe malnutrition, no signs of shock)
 - oral rehydration salts solution with reduced osmolality
 - sodium 75 mmol/L, potassium 20 mmol/L, glucose 75 mmol/L
 - ReSoMal (45 mmol/L sodium, 40 mmol/L potassium, magnesium, zinc, copper, sucrose)
 - 5 ml/kg every 30 minutes for first 2 hours
 - 5 ml/kg/hour for next 4-10 hours
 - may use even lower sodium concentration (45-60 mmol/L) because high intake may cause heart failure, especially in those with edema
 - if hypothermic (rectal temperature < 35.5°C or axillary temperature < 35 degrees C)
 - immediately initiate feeding every 2 hours, day and night
 - keep child clothed/warm with head covered
 - if infection present, give antibiotics
 - if hypoglycemic (glucose < 54 mg/dL)
 - give 50 mL of 10% glucose or sucrose solution orally or by nasogastric tube
 - follow by feeding, as soon as possible
 - if child unconscious, give 5 mL/kg of 10% glucose intravenously or by nasogastric tube
 - check blood sugar after 30 minutes; if low give more 10% glucose

- if rectal temperature < 35.5 degrees C or if decline in level of consciousness, repeat glucose measure with Dextrostix and treat accordingly
- if electrolyte imbalance, add extra potassium (3-4 mmol/kg/day) and magnesium (0.4-0.6 mmol/kg) to feeds
- for micronutrient deficiencies
 - add 20 mL electrolyte-mineral solution to 1 L oral rehydration salts solution or food
 - potassium chloride 224 g/24 mmol per 20 mL
 - tripotassium citrate 81 g/2 mmol per 20 mL
 - magnesium chloride 76 g/3 mmol per 20 mL
 - zinc acetate 8.2 g/0.3 mmol per 20 mL
 - copper sulfate 1.4 g/ 0.045 mmol per 20 mL
 - if available add sodium selenate (selenium) 0.028 g and potassium iodide (iodine) 0.012 g
 - or give multivitamin supplements
 - folic acid 5 mg on day 1, then 1 mg/day
 - zinc as acetate, sulfate or gluconate 2 mg elemental zinc/kg/day
 - copper 0.3 mg elemental copper/kg/day
 - once child begins to gain weight, add ferrous sulfate 3 mg elemental iron/kg/day
 - may give vitamin A orally on day 1 - age < 6 months 50,000 units, age 6-12 months 100,000 units, > 12 months old 200,000 units
- dietary treatment
 - start feeding as soon as possible
 - begin low osmolarity and low lactose diet, providing 330-420 kJ/kg energy and 1-1.5 g/kg protein per day
 - feed every 2 hours day and night; if not possible, every 3 hours
 - use recipe for milk based starter formula F-75 or milk and cereal based F-75 for lower osmolarity as found in WHO recipe
 - if intake doesn't total 330 kJ/kg/day, feed remainder by nasogastric tube
- rehabilitation phase
 - 5 weeks of therapy following treatment for acute phase
 - as indicated by return of appetite
 - feed frequently unlimited quantities to attain daily intake of 630-920 kJ/kg/day energy and 4-5 g/kg/day protein
 - ensure gradual increase in energy/protein intake to avoid cardiac failure
 - use recipe for milk based formula F-100 as found in WHO recipe

- may use modified formula, locally available cereal, or other complementary foods that have equal energy and protein content
- ensure formula provides 420 kJ/100 mL and 2.9 g protein/100 ml
- may continue breastfeeding but give diet first
- weight gain recommendations
 - > 10 g/kg/day - continue with same treatment
 - 5-10 g/kg/day - verify intake targets are met or check for infection
 - < 5 g/kg/day - provide full assessment to include inadequate feeding, untreated infection, tuberculosis, and psychological problems
- Reference - [BMJ 2003 Jan 18;326\(7381\):146 full-text](#)

APPENDIX 10 – MALARIA TREATMENT GUIDELINES

Guidelines for Treatment of Malaria in the United States (Based on drugs currently available for use in the United States – updated May 18, 2009)

1

CDC Malaria Hotline: (770) 488-7788 Monday-Friday 8 am to 4:30 pm EST – (770) 488-7100 after hours, weekends and holidays

Clinical Diagnosis/ <i>Plasmodium</i> species	Region Infection Acquired	Recommended Drug and Adult Dose	Recommended Drug and Pediatric Dose <i>Pediatric dose should NEVER exceed adult dose</i>
Uncomplicated malaria/ <i>P. falciparum</i> or Species not identified If “species not identified” is subsequently diagnosed as <i>P. vivax</i> or <i>P. ovale</i> : see <i>P. vivax</i> and <i>P. ovale</i> (below) re. treatment with primaquine	Chloroquine-resistant or unknown resistance ¹ (All malarious regions except those specified as chloroquine-sensitive listed in the box below. Middle Eastern countries with chloroquine-resistant <i>P. falciparum</i> include Iran, Oman, Saudi Arabia, and Yemen. Of note, infections acquired in the Newly Independent States of the former Soviet Union and Korea to date have been uniformly caused by <i>P. vivax</i> and should therefore be treated as chloroquine-sensitive infections.)	A. Atovaquone-proguanil (MalaroneTM)¹ Adult tab = 250 mg atovaquone/ 100 mg proguanil 4 adult tabs po qd x 3 days	A. Atovaquone-proguanil (MalaroneTM)¹ Adult tab = 250 mg atovaquone/ 100 mg proguanil Peds tab = 62.5 mg atovaquone/ 25 mg proguanil 5 - 8kg: 2 peds tabs po qd x 3 d 9-10kg: 3 peds tabs po qd x 3 d 11-20kg: 1 adult tab po qd x 3 d 21-30kg: 2 adult tabs po qd x 3 d 31-40kg: 3 adult tabs po qd x 3 d > 40 kg: 4 adult tabs po qd x 3 d
		B. Artemether-lumefantrine (CoartemTM)² 1 tablet = 20mg artemether and 120 mg lumefantrine A 3-day treatment schedule with a total of 6 oral doses is recommended for both adult and pediatric patients based on weight. The patient should receive the initial dose, followed by the second dose 8 hours later, then 1 dose po bid for the following 2 days. 5 - <15 kg: 1 tablet per dose 15 - <25 kg: 2 tablets per dose 25 - <35 kg: 3 tablets per dose ≥35 kg: 4 tablets per dose	
		C. Quinine sulfate plus one of the following: Doxycycline, Tetracycline, or Clindamycin Quinine sulfate: 542 mg base (=650 mg salt) ³ po tid x 3 or 7 days ⁴ Doxycycline: 100 mg po bid x 7 days Tetracycline: 250 mg po qid x 7 days Clindamycin: 20 mg base/kg/day po divided tid x 7 days	C. Quinine sulfate³ plus one of the following: Doxycycline⁵, Tetracycline⁵ or Clindamycin Quinine sulfate: 8.3 mg base/kg (=10 mg salt/kg) po tid x 3 or 7 days ⁴ Doxycycline: 2.2 mg/kg po every 12 hours x 7 days Tetracycline: 25 mg/kg/day po divided qid x 7 days Clindamycin: 20 mg base/kg/day po divided tid x 7 days
		D. Mefloquine (LariamTM and generics)⁶ 684 mg base (=750 mg salt) po as initial dose, followed by 456 mg base (=500 mg salt) po given 6-12 hours after initial dose Total dose= 1,250 mg salt	D. Mefloquine (LariamTM and generics)⁶ 13.7 mg base/kg (=15 mg salt/kg) po as initial dose, followed by 9.1 mg base/kg (=10 mg salt/kg) po given 6-12 hours after initial dose. Total dose= 25 mg salt/kg

¹ NOTE: There are 4 options (A, B, C, or D) available for treatment of uncomplicated malaria caused by chloroquine-resistant *P. falciparum*. Options A, B, and C are equally recommended. Because of a higher rate of severe neuropsychiatric reactions seen at treatment doses, we do not recommend option D (mefloquine) unless the other options cannot be used. For option C, because there is more data on the efficacy of quinine in combination with doxycycline or tetracycline, these treatment combinations are generally preferred to quinine in combination with clindamycin.

² Take with food or whole milk. If patient vomits within 30 minutes of taking a dose, then they should repeat the dose.

³ US manufactured quinine sulfate capsule is in a 324mg dosage; therefore 2 capsules should be sufficient for adult dosing. Pediatric dosing may be difficult due to unavailability of non-capsule forms of quinine.

⁴ For infections acquired in Southeast Asia, quinine treatment should continue for 7 days. For infections acquired elsewhere, quinine treatment should continue for 3 days.

⁵ Doxycycline and tetracycline are not indicated for use in children less than 8 years old. For children less than 8 years old with chloroquine-resistant *P. falciparum*, atovaquone-proguanil and artemether-lumefantrine are recommended treatment options; mefloquine can be considered if no other options are available. For children less than 8 years old with chloroquine-resistant *P. vivax*, mefloquine is the recommended treatment. If it is not available or is not being tolerated and if the treatment benefits outweigh the risks, atovaquone-proguanil or artemether-lumefantrine should be used instead.

⁶ Treatment with mefloquine is not recommended in persons who have acquired infections from Southeast Asia due to drug resistance.

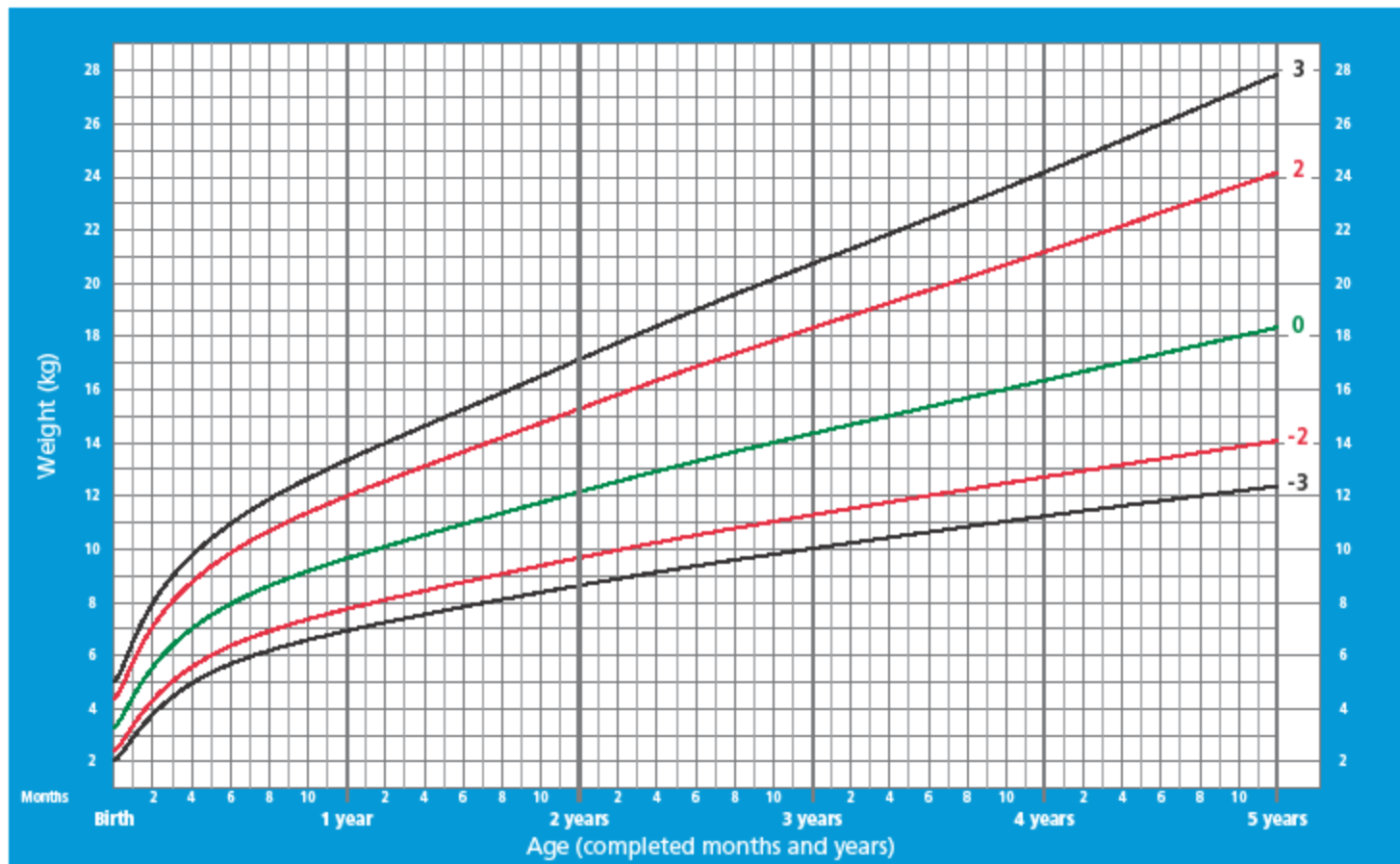
⁷ Primaquine is used to eradicate any hypnozoites that may remain dormant in the liver, and thus prevent relapses, in *P. vivax* and *P. ovale* infections. Because primaquine can cause hemolytic anemia in G6PD-deficient persons, G6PD screening must occur prior to starting treatment with primaquine. For persons with borderline G6PD deficiency or as an alternate to the above regimen, primaquine may be given 45 mg orally one time per week for 8 weeks; consultation with an expert in infectious disease and/or tropical medicine is advised if this alternative regimen is considered in G6PD-deficient persons. Primaquine must not be used during pregnancy.

⁸ NOTE: There are three options (A, B, or C) available for treatment of uncomplicated malaria caused by chloroquine-resistant *P. vivax*. High treatment failure rates due to chloroquine-resistant *P. vivax* have been well documented in Papua New Guinea and Indonesia. Rare case reports of chloroquine-resistant *P. vivax* have also been documented in Burma (Myanmar), India, and Central and South America. Persons acquiring *P. vivax* infections outside of Papua New Guinea or Indonesia should be started on chloroquine. If the patient does not respond, the treatment should be changed to a chloroquine-resistant *P. vivax* regimen and CDC should be notified (Malaria Hotline number listed above). For treatment of chloroquine-resistant *P. vivax* infections, options A, B, and C are equally recommended.

APPENDIX 11 – GROWTH CURVES

Weight-for-age BOYS

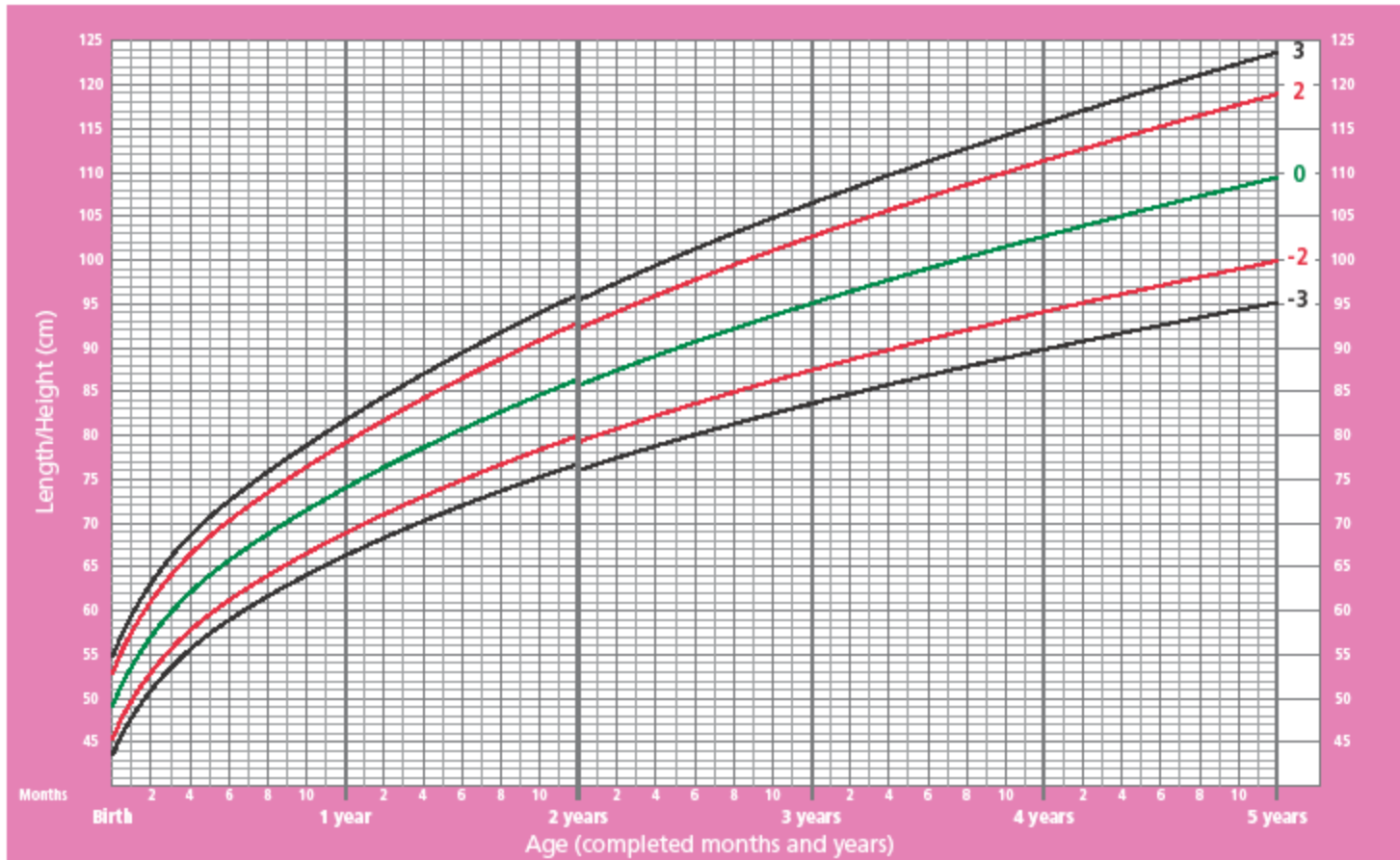
Birth to 5 years (z-scores)



WHO Child Growth Standards

Length/height-for-age GIRLS

Birth to 5 years (z-scores)



WHO Child Growth Standards

APPENDIX 12 –PATIENT EDUCATION MATERIALS AVAILABLE IN CREOLE

1. Care of Lymphedema (from CDC)
2. Immunizations
3. HPV and Cervical Cancer (developed by FHM)
4. HIV
5. TB
6. Sanitation (from Canadian Embassy)
7. Hygiene (from Canadian Embassy)
8. Nutrition (from Canadian Embassy)

APPENDIX 13 –USEFUL PHONE NUMBERS AND ADDRESSES

FHM US Office: 919-382-5500

FHM Fondwa:

Association of Peasants of Fondwa Guest House

Sister Carmelle Voltaire

011-509-3744-0369 (cell)

voltaire_mariecarmelle@yahoo.fr

Sister Judy Dohner

011-509-3650-6929 (cell)

JDohnerHM@aol.com

Father Joseph (Emergency Only)

011-509-2222-0954 (home)

011-509-3744-5383 (cell)

Apf222@aol.com

FHM Blanchard Clinic:

Leon and Jacky Dorleans (Emergency Only)

Pastor and Director of Christian Community Church (5 locations including Blanchard)

Director of the Christian Community Church School in Blanchard/Terre Noire

Delmas #3

Rue Guignard

Port-au-Prince, Haiti, WI

011 (509) 2224-2040 (Home)

011 (509) 3726-6408 (Leon's cell)

011 (509) 3717-8142 (Jacky's cell)

leojac@hughes.net

FHM Leogane:

Dr. Delson Merisier

Route Timo # 9

011-509-3443-7959

011-509-3706-9107

delsonmerisier@yahoo.fr

US Embassy Port-Au-Prince: 229-8000

Tabarre 41

Route de Tabarre

Port-au-Prince

7am-3:30pm

UNICEF: (505) 2245-3525
17, Rue Armand Holly
Debussy
Port-au-Prince

General Hospital:
Presidential Palace and Stade Sylvio Cator

GHEKIO (Le Groupe Haitien d'Etude du Sarcome de Kaposi et des Infection
Opportunistes): 222-0031 or 222-2241
33 Blvd Harry Truman
PAP

Croix des Mission
Rte National 1 from Terre Noire/Blanchard

Sanatorium: 221-2873
Chemin Des Dalles
Carrefour Feuilles

Children's Nutrition Program of Haiti
US: 423-495-1122
Hospital Sainte Croix
Programme Nutrition
Port-au-Prince

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Of note, images in this guide were either with the disease topic in eMedicine or found on Google images.