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Priorities & Major Goals

- To properly assess the patient with an infectious disease emergency
- To properly identify the infectious disease emergency
- To understand the specific emergency management
Communicable disease: an infectious disease transmissible by direct contact with an affected individual or the individual's discharges or by indirect means.

Infectious Disease: a disease caused by the entrance into the body of organisms as bacteria, protozoans, fungi, or viruses.
Parasitic Infections

• Parasites enter through the mouth or skin

  – Mouth
    • Drinking
    • Eating

  – Skin
    • Burrowing
    • Bloodstream
Most Common Parasitic Infections

- Malaria
- African Trypanosomiasis ("sleeping sickness")
- Cryptosporidiosis
- Schistosomiasis
Malaria

- Malaria is caused by a parasite called Plasmodium, which is transmitted via the bites of infected female mosquitoes.
- Sub-Saharan Africa
  - 90% of all Malaria cases
  - 1.8 million die each year
  - 1 in 5 childhood deaths

Optigan13, Wikimedia Commons
Clinical Presentation

- In the early stages, malaria symptoms are sometimes similar to those of many other infections such as
  - Fever
  - Chills
  - Headache
  - Fatigue
  - Nausea & vomiting
  - Sweats
  - Dry (nonproductive) cough.
  - Muscle and/or back pain
  - Enlarged spleen
Clinical Presentation

• Cyclic symptoms
  – Parasites develop, reproduce, and released from red blood cells and liver

• In severe cases malaria can lead to impaired function of the brain or spinal cord, seizures, or loss of consciousness
Different Types of Malaria

• *Plasmodium falciparum* - the most severe infections and is responsible for nearly 90% of malaria-related deaths in sub Saharan Africa

• *Plasmodium malariae* - cyclic paroxysms occur every 72 hours, not usually life-threatening

• *Plasmodium ovale* - can rest in the liver for several months up to 4 years after a person is bitten by an infected mosquito

• *Plasmodium vivax* - widest geographic distribution throughout the world
Diagnosis

• Peripheral smear examination
  – Gold-standard in confirming the diagnosis of malaria

• Quantitative Buffy Coat (QBC) Test
  – fluorescence microscopy-based malaria diagnostic test
  – components of blood (including parasites) separate into distinct layers based on their differing densities
Diagnosis

• A clinician who faces these symptoms would need answers to the following questions:
  • Is it malaria?
    If yes;
  • What is the species?
  • Is it severe?
  • Is it new/ recurrence?
  • Is it active?
Diagnosis

• Malaria may be described as simple or uncomplicated when the malaria infection is **NOT** life threatening and is easily treatable.

• The definition of complicated Malaria is based on clinical presentation:
  – A change in behavior, confusion or drowsiness;
  – Impaired consciousness or unarousable coma;
  – Multiple/recurrent convulsion;
  – Deep breathing or respiratory distress;
  – Pulmonary edema (x-ray);
  – Circulatory collapse or shock;
  – Jaundice;
  – Bleeding tendency or anemia;
  – Prostration- generalized weakness so the patient cannot walk, or sit up without assistance.
As a nurse, what nursing interventions do you expect?
• Blood tests
• Urine Analysis

• Your laboratory results would include:
  – P. falciparum malaria with possibly hyperparasitemia
  – Hypoglycemia
  – Metabolic acidosis
  – Severe anemia packed cell volume < 20%, Hgb < 6
  – Hemoglobinuria
  – Hyperlacticemia
  – Renal impairment, abnormal creatinine and urea levels
Risk factors for Malaria infection

• Children between the age of 6 months and 5 years
• People from non malaria to malaria endemic areas
• Returnees to highly endemic areas
• Indigenous pregnant women
• People with sickle cell disease
• People of all ages, no matter their location, who have lowered immunity and have exposure to Malaria
Treatment of Malaria

- The effectiveness of antimalarial drugs differs with different species of the parasite and with different stages of the parasite's life cycle.

- To alleviate symptoms: Chloroquine, quinine, artemisinin combinations (Blood schizonticidal drugs).

- To prevent relapses: Primaquine (tissue schizonticidal drugs).

- To prevent spread: Primaquine for *P. falciparum*, Chloroquine for all other.
# Treatment

<table>
<thead>
<tr>
<th>Type of Infection</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>P. Vivax</td>
<td>Chloroquine 25 mg of salt/kg over 36-48 hours + Primaquine for 14 days.</td>
</tr>
<tr>
<td>P. Falciparum</td>
<td>Treatment depends on severity and sensitivity Artesunate+Pyrimethamine/sulphadoxine or other ACTs, OR Quinine plus tetracycline as suppressive therapy + Primaquine as gametocytocidal in single dose</td>
</tr>
<tr>
<td>Mixed (P. Vivax + P. falciparum)</td>
<td>ACT as for <em>P. falciparum</em> + Primaquine as for <em>P. vivax</em></td>
</tr>
</tbody>
</table>
Case Study
Summary

You have now come to the end of this lecture on severe and complicated Malaria. You have learned that severe and complicated Malaria is a medical emergency and it requires early diagnosis and prompt treatment.
TUBERCULOSIS
Tuberculosis

• Mycobacterium Tuberculosis (TB) = #1 Cause of Death Worldwide from a Single Infectious Agent

• TB most common in lungs (85%), but can occur in other parts of the body (extrapulmonary)
Transmission

• Infection = Person to Person via Airborne Infectious Aerosol:
  • Coughing
  • Sneezing
  • Talking
Clinical Presentation

• Prolonged cough
• Chest pain
• Hemoptysis
• Fever
• Chills
• Night sweats
• Fatigue
• Loss of appetite
• Weight loss/failure to gain weight
Droplet nuclei are inhaled

Macrophages and T lymphocytes try to contain the infection

In weaker immune systems, the wall loses integrity and the infection spreads to other alveoli/other organs
Children with TB

- Children have few tubercle bacilli in lungs, therefore, are rarely infectious

- Children less than 12 years of age usually lack the pulmonary force to produce airborne bacilli

- For a case of childhood TB infection, it is likely that an adolescent or adult transmitted TB bacilli to the child
Types of TB

• Active Tuberculosis:
  • When the immune system of a patient with dormant TB is weakened, the TB can become active (reactivate) and cause infection in the lungs or other parts of the body

• Latent Tuberculosis:
  • do not feel sick and do not have any symptoms
  • They are infected with *M. tuberculosis*, but do not have TB disease
  • Only sign of TB infection is a positive reaction to the tuberculin skin test or TB blood test
  • Are NOT infectious and cannot spread TB
Diagnosis of TB

- PPD
- Sputum Culture
- Chest X-Ray
Diagnosis

- **PPD – Purified Protein Derivative**
  - The Tuberculin Skin Test Identifies Individuals infected with Mycobacterium Tuberculosis
  - Injection Site = Intradermally Dorsal Side of Forearm
  - Inflammatory Reaction = 24-72 Hours
  - Result Test in 48-72 Hours (If Positive at 6 Days = true Positive)

[Image: Greg Knobloch, Wikimedia Commons]
Chest X-ray

• The chest X-ray examination is done and if there are any changes in the lung, a sputum sample will be sent for microscopic examination & culture
A. Infiltrates in left lung  
B. Bilateral advanced pulmonary tuberculosis

Images courtesy of Centers for Disease Control and Prevention.26
Sputum Culture

• Definitive diagnosis of tuberculosis requires the identification of M tuberculosis in a culture of a diagnostic specimen

• The most frequent sample used from a patient with a persistent and productive cough is sputum

• mycobacteria grow slowly, 3 to 6 weeks may be required for detectable growth on solid media.
Treatment

• First-line anti-TB agents:
  • isoniazid (INH)
  • rifampin (RIF)
  • ethambutol (EMB)
  • pyrazinamide (PZA)
<table>
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<tr>
<th>Diagnosis</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB Infection</td>
<td>INH – 9 Months</td>
</tr>
<tr>
<td>TB Disease</td>
<td>First 2 months – INH, RIF, PZA, EMB (add EMB if drug resistance is suspected)</td>
</tr>
<tr>
<td></td>
<td>Next 4 months – 2 most effective sensitive drugs (INH &amp; RIF in pan-sensitive cases)</td>
</tr>
<tr>
<td>3 or 4 drugs</td>
<td></td>
</tr>
<tr>
<td>Multidrug resistant TB disease (resistance to at least INH &amp; RIF)</td>
<td>Treat with sensitive drugs for at least 18 months</td>
</tr>
</tbody>
</table>
As a nurse, what is your nursing role?
Nurses Role

• Patients with TB should be monitored regularly to ensure that:
  • No interruptions occur in treatment;
  • Serious side-effects from the treatment are quickly identified;
  • There is improvement in the patient's condition, although this is often very gradual

• The nurse's role is vital in the control of TB and for the successful completion of the patient's therapy
Case Study #1

Physical Exam:
BP 130/70 HR 90 RR18 T-38.6

Lung:
Crackles in the Right Upper lung (RUL) There is Dullness to Percussion in the RUL

Heart:
Regular Rate Rhythm No Murmurs
Pt is having difficulty breathing

What nursing interventions do you expect?
• Administer oxygen if ordered and as ordered by a physician

• Give the TB patients fluids to loosen up secretions for easier expulsion from the lungs

• Position the patient in a high fowlers position to reduce the work needed to breathe

• Encourage and provide rest periods so the tuberculosis patient can have energy to breathe.