CHAPTER 15:

DIET THERAPY 1

15.1 Introduction of the Unit of Learning / Unit of Competency

This unit addresses the unit of competency: provide diet therapy in diseases states involving GIT disorders; diarrhoea, nausea and vomiting, constipation, peptic ulcers, gastritis, diverticular disease, hiatal hernia, celiac disease. Febrile disorders; malaria, pneumonia, coughs, TB, measles and cancers.

15.2 Performance Standard

By the end of this unit of learning/competency, the trainee should be able to describe the relationship between nutrition and disease as well as apply diet planning principles as per resource materials, policies and guidelines; provide nutritional management of GIT disorders in accordance with policies and guidelines; provide nutritional management of the respiratory and febrile disorders in line with resources materials, policies and guidelines; manage different types of cancers with nutrition as per the clients requirements, resource materials and policies and guidelines; provide nutrition interventions in HIV/AIDs in line with MOH/ WHO guidelines, material resources and patient requirements; and provide nutritional management of childhood disorders based on client's diagnosis, resource materials, and policies& guidelines.

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15.3 Learning Outcomes

15.3.1 List of the Learning Outcomes

i. Identify terminologies in diet therapy I

ii. Demonstrate understanding in nutrition management of GIT disorders

iii. Demonstrate understanding in nutrition management of the respiratory and febrile disorders

iv. Demonstrate understanding in nutritional management of cancers

v. Demonstrate understanding in nutritional management of HIV and AIDS

vi. Demonstrate understanding in nutritional management of childhood disorders

15.3.2 Learning Outcome 1: Identify terminologies in diet therapy I

15.3.2.1 Learning Activities

Learning Activities	Special instructions
1. Identify terminologies under diet therapy I as per resource materials, policies and guidelines	• Use terminologies related to diet therapy
2. Illustrate the relationship between nutrition and disease and the roles of nutrition in disease management as per resource materials, policies and guidelines	• Consider the relationship between nutrition and disease
3. Identify and describe diet planning principles and objectives of diet therapy as per resource material, policies and guidelines	• Apply diet planning principles

15.3.2.2 Information Sheet

Definitions

Nutritional care: application of the art and science of nutrition in helping people select or obtain food for the primary purpose of nourishing their bodies in health or disease throughout their **lifecycle.**

Therapeutic diets: It is a diet that is modified from a normal diet to meet the requirements of the ill/ sick individual.

Normal diet: It consists of any and all foods eaten by the person in health. It satisfies the nutritional needs of most patients and serves as the basis for planning modified diets.

Diet modification: It refers to the action of adjusting a normal diet to change its consistency/ texture, flavor and nutrient contents.

Relationship between Nutrition and Disease

Food provides required raw materials for normal cellular activity. Nutrient deficiency impairs this activity and results to disease. Deficiency may be as a result of inadequate nutrient intake, malabsorption, increased requirement or increased excretion/nutrient loss.

Nutrients have nourishment and pharmacologic function and so they are directly involved with disease prevention. Examples:

- Zinc, Vitamin A, Vitamin B6 and folate support immune function
- Vitamin C, Vitamin E, selenium and carotenoids are antioxidants
- Iron, Vitamin A, zinc and Vitamin Care involved in tissue synthesis.

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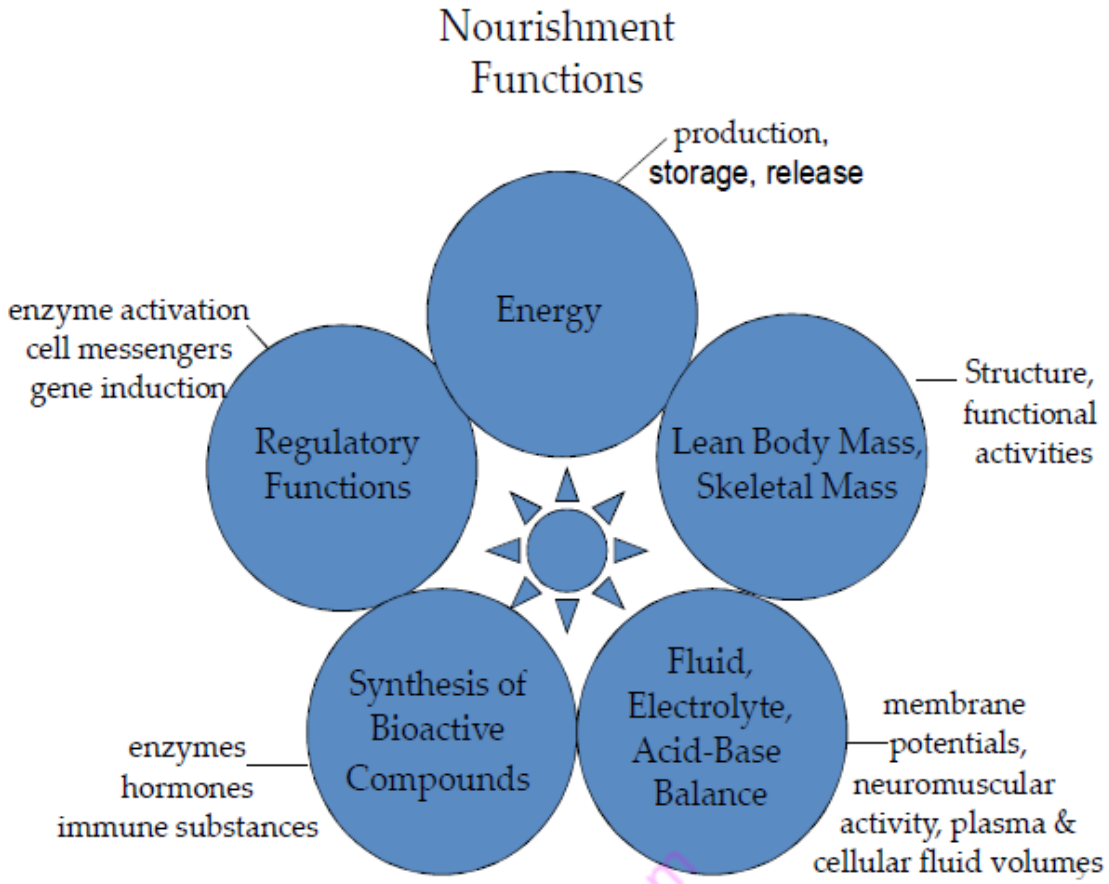

Nourishment functions

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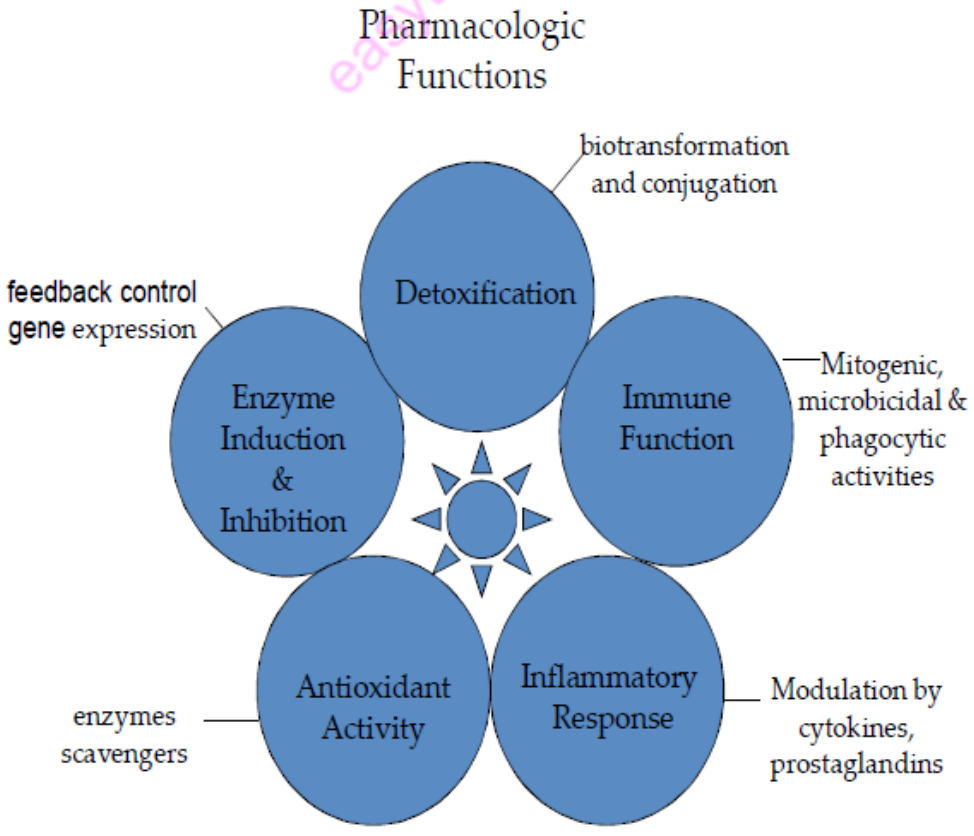

Pharmacologic functions

The Goals of Nutrition in Disease Prevention

1. To optimize cellular activity and tissue/organ function
    a) Provide sufficient amounts to satisfy daily demands of adequacy, balance and variety in food choices
    b) Maintain adequate reserves for intermittent increased demand through habitual diet and dietary patterns
2. To reduce the metabolic burden imposed on cardiac, pulmonary, renal, hepatic, musculoskeletal systems by environmental factors
    a) Minimize workload of organ systems by reducing stress on organs involved in transport, metabolism and elimination of nutrients and metabolic waste.
    b) Eliminate compensatory responses required to maintain normal function
3. To support cellular defenses that protects tissue integrity
    a) Maintain immune system competence
    b) Promote efficiency of detoxification systems by controlling levels of reactive chemical intermediates
    a) Prevent oxidative damage that is involved in pathogenesis of most chronic diseases and reduction of efficiency of immune cells

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Diet Planning Principles:

When planning a healthy diet the following concepts are key:

- **Adequacy:** Ensuring that the diet contains all nutrients in adequate amounts
- **Balance**: This principle requires that not too much of any type of a nutrient is provided in a diet. Intake of a particular nutrient should be equal to individual needs.
- **Calorie control:** Calorie control calls on one to ensure that amount of energy consumed is equal to energy expenditure. Not too many or too few calories are consumed.
- **Moderation:** Requires that no particular food will be consumed in excess. One food should not crowd the diet.
- **Variety:** Nutrients should be sourced from a variety of foods. There's no superfood as different types of foods contain different amounts of each nutrient.

15.3.2.3 Self-Assessment

1. Outline the goals of nutrition in disease prevention
2. _____ is the application of the art and science of nutrition in helping people select or obtain food for the primary purpose of nourishing their bodies in health or disease throughout their lifecycle.

   A. Nutrition

   B. Nutritional care

   C. Diet therapy

   D. Modified diet

3. _____refers to the action of adjusting a normal diet to change its consistency/ texture, flavour and nutrient contents.

   A. Balance

   B. Diet modification

   C. Diet

   D. Variety

4. The following nutrients are antioxidants except:

   A. Vitamin c

   B. Vitamin e

   C. Selenium

   D. Vitamin D

5. _____requires that no particular food will be consumed in excess. One food should not crowd the diet.

   A. Adequacy

   B. Moderation

   C. Variety

   D. Balance

6. The following are pharmacologic functions of nutrients except:

   A. Detoxification

   B. Immune function

   C. Antioxidant activity

   D. Growth and development

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15.3.2.4 Tools, Equipment, Supplies and Materials

- Charts
- Food models
- WHO guidelines
- MOH guidelines
- Ministry of Education
- Skills lab
- Use of LCDs, video clips, charts and other teaching aids
- Invitation of competent expertise
- Computers with internet
- Library and resource centre

15.3.2.5 References

1. Anyang'Nyong'o, H. P. P., & EGH, M. Kenya National Clinical Nutrition And Dietetics Reference Manual First Edition.

2. Cederholm, T., Barazzoni, R., Austin, P., Ballmer, P., Biolo, G., Bischoff, S. C., ... & Jensen, G. L. (2017). ESPEN guidelines on definitions and terminology of clinical nutrition. Clinical Nutrition, 36(1), 49-64.

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15.3.3 Learning Outcome 2: Demonstrate understanding in nutrition management of GIT disorders

15.3.3.1 Learning Activities

Learning Activities	Special instructions
1. Identify and describe terminologies under GIT disorders as per resource materials, policies and guidelines	• Use terminologies related to GIT disorders
2. Identify and describe disorders the upper GIT and nutrition management as per resource materials, policies and guidelines	• Apply knowledge of the examples of upper GIT disorders • Apply knowledge of pathophysiology of upper GIT disorders in diet therapy • Determine how upper GIT disorders affect nutrition • Plan a diet for upper GIT disorders
3. Identify and describe disorders of the lower GIT and nutrition management as per resource materials, policies and guidelines	• Apply knowledge of the examples of lower GIT disorders • Apply knowledge of pathophysiology of lower GIT disorders in diet therapy • Determine how lower GIT disorders affect nutrition • Plan diet for lower GIT disorders

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15.3.3.2 Information Sheet

1. PEPTIC ULCERS

Peptic ulcer is the general term given to an eroded mucosal lesion in the central position of the gastro intestinal tract. The areas affected include the lower portion of the esophagus, the stomach and the first part of the duodenum. A bacteria helicobacter pylori is the biggest cause of peptic ulcers; the second leading cause is the use of non-steroidal anti-inflammatory drugs (NSAIDS) that may damage the stomach lining.

Gastric normally occur in adults 45-60 and duodenal occur at age 20-30.

Causes

- Factors that disrupt the mucosal barrier, permitting hydrogen ions to diffuse into the mucosal tissue where they cause damage that leads eventually to cell distraction and subsequent ulceration
- Enteral gastritis from Helicobacter pylori

- Defect in the pyloric sphincter resulting in reflux of the duodenal content in to the antrum of the stomach where the detergent effect of bile salts reduces mucosal resistance
- NSAID's (non-steroid anti-inflammatory drugs) e.g. aspirin, brufen, diclofenac, paracetamol, dramatically increase the risk of ulcers
- Increased acid secretion
- Increased gastric acid emptying rate
- Reduced ability of the duodenum to handle an acid load
- Stress or nervous tension which causes vasoconstriction or reduce blood supply to the gastric mucosa leaving it unprotected.

Symptoms of peptic ulcers

- Pain
- Vomiting
- Haemorrhage

Relationship of food to gastric irritation

- Hydrochloric acid and pepsin breaks down food proteins
- Mucus protects lining of stomach from being digested by HCL and pepsin
- Ulcer develops when acid pepsin reaction overpowers mucus protection action
- Food causes stomach to expand
- Expansion signals release of hormone that stimulates acid secretions
- Proteins stimulate and neutralize gastric acidity
- Products that result from breakdown stimulate gastric secretions that are responsible for pain experienced 1 to 3hrs after a meal
- Chemical irritants e.g. caffeine and theobromine irritate gastric mucosa
- Stimulants are found in spices, alcoholic beverages, aspirin, tobacco and some other drugs and so should be restricted

Nutritional implications of peptic ulcers

It could lead to:

- Anaemia
- Altered food and nutrient intake

Aims of nutrition management of peptic ulcers

- Reducing and neutralizing stomach acid secretion
- Maintaining acid resistance of gastro-intestinal epithelial tissue

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- Limiting patient's discomfort and reliving their pain
- To provide continuous neutralization of gastric acid
- To promote healing and reduce irritation of GIT
- Restoring good nutrition status
- To reduce mechanical, thermal and chemical irritation to the gastric mucosa

Dietary management

- The patient with peptic ulcer disease should:
- Eat three regular meals daily
- Eat small meals to avoid stomach distension
- Eat slowly
- Use in moderation easily digested fats like fat of whole milk, egg yolk, cream and butter
- Avoid drinking excess coffee and alcohol
- Cut down on or quit smoking
- Avoid using large amounts of aspirin, other NSAID's or other drugs known to damage the stomach lining
- Avoid foods or drinks that cause discomfort
- Eat meals in a relaxed atmosphere as possible
- Take antacids one and three hours after meals and before bedtime

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Foods to avoid

- Fatty and tough meat
- Fried foods
- Sour foods
- Unripe citrus fruits like oranges and sweet lime
- Garlic
- Ginger
- Strongly flavoured vegetables
- Strong spices and condiments
- Chillies
- Pickles
- Strong tea and coffee
- Alcoholic beverages

Foods recommended for use:

- **Cabbage**: fresh juice, fermented or raw has anti inflammatory effects
- **Potatoes**: nutritious, anti acid, soothing and sedating
- **Other vegetables**: carrots, peas, okra, other leafy vegetables that are tolerated

- **Fruits:** orange juice, apples, ripe bananas, avocadoes, pears, pawpaw, apricots, cherimoya and guava
- **Okra:** contain mucilage capable of protecting gastric mucosa
- **Cereals:** porridge, oatmeal, semolina, macaroni products, spaghetti, rice, chapatti and matoke
- **Desserts**: custards, ice creams, cakes
- **Oils:** use polyunsaturated fatty acids
- **Beverages**: buttermilk, malted milk
- **Eggs:** boiled, poached, scrambled
- **Roast beef and lamb**, stewed or baked should be used in moderations because they
- contain purines (non-protein substances that stimulate gastric mucosa)

2. ACUTE GASTRITIS

This is a temporary inflammation of the gastric mucosa, usually self-limiting caused by the indigestion of infectious or corrosive substances e.g. aspirin, food poisoning, radiation therapy, metabolic alcoholism, acute alcoholism and uremia.

Causes

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- Acute gastritis is mainly caused by over eating,
- Over use of alcohol and tobacco
- Chronic or excessive doses of aspirin or non-steroidal anti-inflammatory agents (NSIA)
- Trauma
- Surgery
- Renal failure
- Burns
- Radiation therapy

Symptoms

- Nausea
- Vomiting
- Malaise
- Anorexia
- Headache
- Haemorrhage
- Pain

Nutrition implications

- Anaemia
- Loss of nutrients
- Increased metabolism

Aims of nutrition management

- Relieve pain
- Manage dietary deficiencies

Dietary management

- To allow the stomach time to rest and heal, withhold food for 24 to 48hrs or longer, depending on whether there is bleeding or pain
- Give fluids intravenously during this period
- Add fluids as tolerated following the resting period
- Increase number of feeds according to the patient's tolerance, until a full regular diet is achieved
- Avoid seasoned foods

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3. DUMPING SYNDROME

This is a complication of gastric surgeries in which the pyloric sphincter is removed, bypassed or disrupted. This causes partially digested food to rapidly enter the jejunum, it is quickly digested and creates a hyperosmolar load. Fluid from the intestinal capillaries enters the jejunum, diminishing blood volume and stimulating peristalsis, resulting into low blood pressure and diarrhoea.

Causes

Gastric surgery (post-gastrotomy, hypoglycaemia caused by: pyloroplasties, vagotomies, total gastrotomy, and gastric by-pass surgery)

Symptoms

- Sweating
- Weakness
- Diarrhoea
- Rapid pulse rate
- Dizziness
- Paleness
- Crampy abdominal pain

Nutritional implications

- Loss of nutrients
- Weight loss

Aims of nutrition management

- Provide adequate energy and nutrients to support tissue healing
- Prevent weight loss
- ·**Correct hypoglycaemia in the short term**

Dietary Management

After surgery the following should be done:

- All fluids and foods by mouth should be withheld for 3 to 5 days and the patient fed by nasogastric tube
- Warm water, cold water or Ice chips should be held in mouth or small, infrequent sips of water should be given as tolerated
- Low carbohydrates, clear liquids such as soups, or diluted unsweetened fruit juices should be given and limited to ½ to 1 cup servings, however, at least 6 cups of fluids should be consumed daily to replace losses resulting from diarrhoea.
- Carbonated beverages and milk are not recommended in the initial stages of the diet
- The post-gastrotomy diet then begins with gradual progression to a general diet as tolerated. Bland foods should be started first, but a more important priority is offering the patient foods he/she likes and can tolerate. By the 5th to 7th day most patients can tolerate solid foods
- For persons near desirable body weight about 1.5g to 2g protein should be given (35Kcal

  to 45Kcal/kg)
- Pectin, a dietary fibre found in fruits and vegetables maybe helpful in treating dumping syndrome. Pectin delays gastric emptying, slow carbohydrate absorption and reduces glycemic response, though small dry meals are of more benefit
- Vitamin and mineral supplementation maybe necessary depending on the extent of surgery and whether the symptoms of dumping syndrome persist
- Generally, liquids are served between meals rather than with meals to slow the passage of the food mass.
- Limit simple carbohydrates. Lie down immediately after eating to help slow the transit of food to the intestines.
- Clients who experience reflux should not lie down after eating. Beware that lactose intolerance may develop and produce discomfort in relation to milk and milk products

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4. INFLAMATORY BOWEL DISEASE (IBD)

This refers to inflammation of the bowel. There are two conditions under IBD namely:

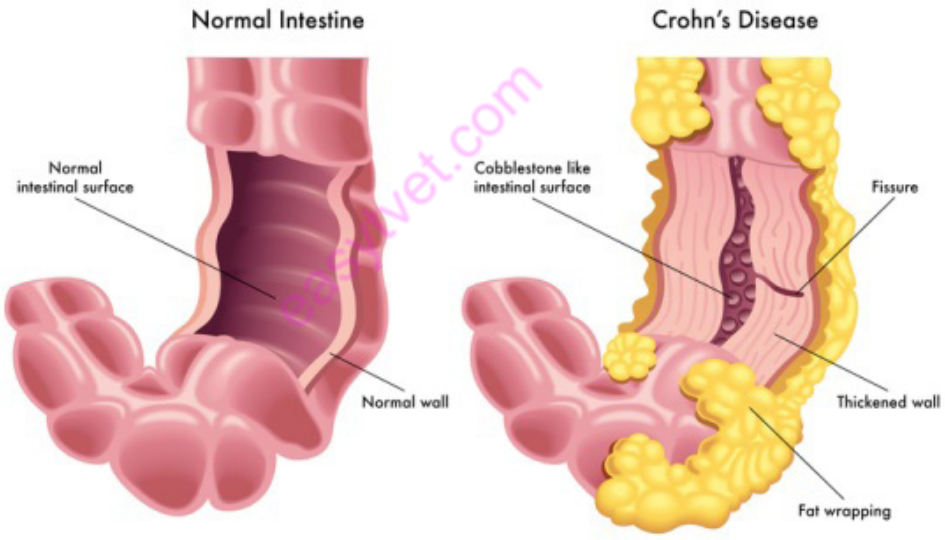
i. Crohn's disease

ii. Ulcerative colitis

iii. Crohn Disease

Crohn disease is a chronic inflammation of the digestive tract which can affect any part of the digestive tract. Usually, it involves the terminal part of the small intestines, the beginning of the colon and around the anus. The inflammation may cause extensive damage to the digestive tract as ulcers can form in the areas affected by inflammation. The lining of the small intestines may be damaged to the extent of causing malabsorption. Impaired absorption can lead to malnutrition, dehydration, mineral and vitamin deficiencies. As a result of inflammation, the intestinal wall becomes thicker, causing the intestinal lumen to narrow. A narrow lumen is susceptible to obstruction, which can be permanent.

Crohn's disease may also cause anal fissures, fistulas and abscess.



Crohn's disease

Causes

- Inadequate food intake
- Loss of protein in to the gut lumen
- Fever
- Low grade but chronic intestinal obstruction
- Malabsorption or mal-digestion of fat and protein
- Possibly zinc deficiency

Symptoms

- Fatigue
- Anorexia
- Variable weight loss
- Right lower quadrant pain or cramping
- Diarrhea
- Fever
- Stricture formation may precipitate bowel obstruction.

Nutrition implications

- Inadequate food and nutrient intake
- Malabsorption and mal-digestion
- Increased nutrient needs

Aims of nutrition management

- Restoration of good nutritional status
- Relief of discomfort

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Dietary management

- During acute flare-ups bowel rest and parenteral nutrition is recommended
- Later in patients who cannot tolerate whole foods elemental oral formula maybe useful
- Energy and protein content of the diet should be high to promote healing and restore weight. Provide 40 – 50Kcal/Kg, and for protein 1 – 1.5g/Kg
- Give a low fiber diet to minimize bowel stimulation
- Give small frequent meals that are better tolerated than three large meals, this may help
- maximize intake
- Assess status of calcium, magnesium and zinc since steatorrhea promotes their loss

ii. **Ulcerative Colitis**

The disease is characterized by inflammation and ulceration of the large intestines that always begins in the rectum.

Cause

It is likely that intestinal allergy caused by some foods like milk maybe responsible for the disease in some cases.

Symptoms

- Passage of loose stool with mucus and blood accompanied by pain and spasms
- Loss of appetite
- Rectal bleeding
- Fever
- Ulcerative lesions in the mucosa of the large intestines
- Dehydration
- Electrolyte imbalance
- Anorexia
- Malnutrition

Nutrition implications

- Anaemia
- Increased nutrient needs
- Fluid imbalance
- Food mal-digestion and nutrient malabsorption

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Aims of nutrition management

- To relieve pain and inflammation
- To restore and maintain optimal nutritional status

Dietary management

Dietary management is the same as in Crohn' disease. However, no dietary interventions seem to lessen disease activity. And unlike Crohn's disease where intestinal surgery fails to cure the disorder, removal of the colon and the rectum does cure ulcerative colitis

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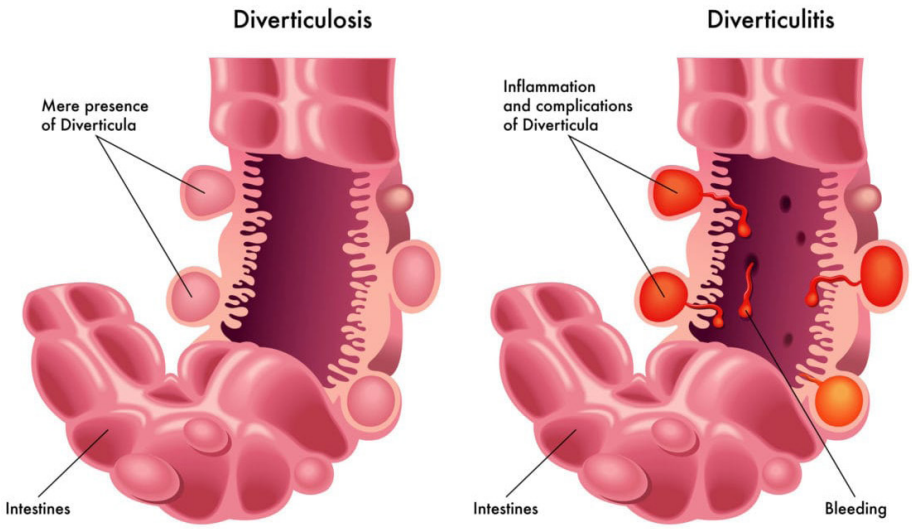
5. DIVERTICULAR DISEASE

Diverticular refers to the small out pouching in the gastrointestinal tract. These pouching may occur in the oesophagus as well as in the lower intestine. It is caused by increased pressure within the intestinal lumen, which may be related to chronic constipation and long term low fibre diets. Diverticular usually occur in the weakened areas of the tissue resulting from such factors as tissue irritation, secretory or muscular malfunctioning.

Diverticulitis refers to inflammation of the Diverticular.



Diverticulosis

Causes

- Aging
- Low fibre diets

Symptoms

- Gross bleeding
- Low Hb and albumin levels
- Ulceration or even perforations of the lower intestine
- Dysphagia
- Cramping
- Alternating periods of diarrhoea and constipation
- Regurgitation
- Bad breath and foul taste in the mouth
- Low grade fever

Nutritional implications

- Anaemia
- Increased nutrient needs

Aims of nutrition management

- To restore nutritional status
- To relieve pain and enhance healing

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Dietary management

- In chronic cases, provide a moderately fiber restricted diet
- In acute cases, provide clear liquid diet with progression to a very low-residue diet
- Ensure high calories diet to cater for the increased calories needs, except in overweight
- cases where normal calories requirement may be provided to check on the weight
- High protein is needed for repair of worn out tissues
- Ensure that the diet is of low fats

6. GASTROESOPHAGEAL REFLUX DISEASE (GERD)/OESOPHAGITIS

This is a condition that produces indigestion and heartburn from the backflow of acidic gastric juices onto the lower oesophageal mucosa.

Causes

- Irritation of the oesophageal mucosa
- Stress
- Ingestion of an irritating agent
- Viral inflammation
- Fungal infection
- Intubation
- Aging
- Radiation such as for lung cancer treatment
- Medication that gets stuck in oesophagus e.g. tetracycline

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Chronic or reflux esophagitis is a result of recurrent gastroesophageal reflux owing to a hiatal hernia, reduced Lower Oesophageal Sphincter (LES) pressure, increased abdominal pressure and recurrent vomiting.

Symptoms

- Heartburn
- Regurgitation
- Dysphagia
- Bleeding

Nutrition implication

- Indigestion
- Anaemia

Aims of nutritional management

- Prevent irritation of the oesophageal mucosa in the acute phase
- Prevent oesophageal reflux
- Decrease the irritating capacity or acidity of gastric juice

Dietary Management

- In acute phase give liquid diet that is less abrasive to the oesophagus
- Avoid acidic foods e.g. citrus fruits, tomato products, coffee, carbonated beverages, alcohol and spices (all of which lower LES) according to individual tolerance.
- Provide low fat foods and small frequent meals
- Timing of the evening meal is important. The patient should consume nothing except water for 3 hours before lying down
- Avoid or quit smoking as it also triggers acid production
- Elevate the head of the bed when sleeping
- Avoid clothing that is tight on the abdominal area and maintain upright posture during and after eating.
- Reduce weight if overweight.

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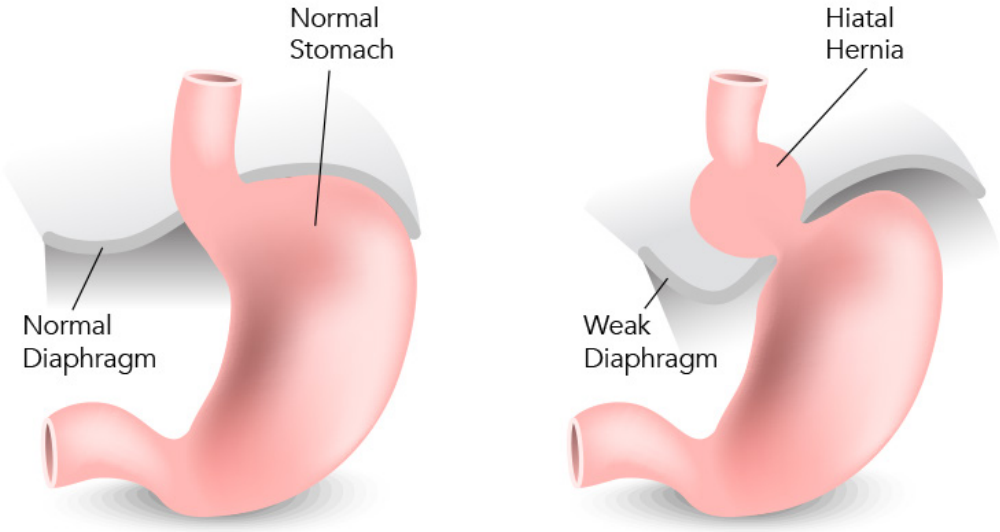
7. HIATAL HERNIA

Refers to anatomical abnormality in which part of the stomach protrudes through the diaphragm into the chest; that is an out pouching of a portion of the stomach in to the chest through the esophageal hiatus of the diaphragm.

Usually the stomach is completely below the diaphragm (the sheet of muscle that separates the lungs and chest from the abdomen). But in some people, part of the stomach or the sphincter can slide up into the chest cavity. This is called a hiatus hernia. It's quite common, but in some people it may cause heartburn due to reflux of stomach acid.



Hiatal hernia

Causes

Larger than normal oesophagi hiatus (opening in the diaphragm through oesophagus passes from the chest into the abdomen)

Symptoms

- Discomfort after heavy meals
- Stomach distension
- Difficulty in breathing, lying down and bending

Dietary management

- In acute phase provide liquid diet that is less abrasive to the oesophagus
- Avoid acidic foods e.g. citrus fruits, tomato products, coffee, carbonated beverages, alcohol, spices (all of which lower LES) according to individual tolerance
- Provide low fat foods and small frequent meals
- Timing of the evening meal is important. The patient should consume nothing except water for 3 hours before lying down
- Avoid or quit smoking as it also triggers acid production
- Elevate the head of the bed when sleeping
- Avoid clothing that is tight on the abdominal area and maintain upright posture during and after eating
- Reduce weight if overweight.

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15.3.3.3 Self-Assessment

1. Distinguish between ulcerative colitis and Crohn's syndrome
2. Outline the symptoms of dumping syndrome
3. List the food recommended for people suffering from gastroesophageal reflux disease
4. Which one of the following is not a cause of peptic ulcers?
   A. Enteral gastritis from helicobacter pylori
   B. Defect in the pyloric sphincter resulting
   C. Increased acid secretion
   D. Reduced gastric acid emptying rate
5. Which one of the following is an implication of acute gastritis?
   A. Weight gain
   B. Anaemia
   C. Vomiting
   D. Pain

6. Which of the following statements is not true about gastroesophageal reflux disease

   A. Provide low fat foods

   B. Patient should consume nothing except water for 3 hours before lying down

   C. Increase caffeine intake

   D. Avoid or quit smoking

7. _____ is an anatomical abnormality in which part of the stomach protrudes through the diaphragm into the chest

   A. Diverticular Disease
   B. Crohn's Disease
   C. Hiatal Hernia
   D. Oesophagitis

8. Chronic or reflux esophagitis may result from _____

   A. Weight loss

   B. High fibre diet

   C. Medication such as asprin

   D. Reduced Lower Oesophageal Sphincter (LES) pressure

15.3.3.4 Tools, Equipment, Supplies and Materials

- Food models
- Charts
- WHO guidelines
- MOH
- Ministry of Education
- Skills lab
- Use of LCDs, video clips, charts and other teaching aids
- Invitation of competent expertise
- Computers with internet
- Library and resource centre

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15.3.3.5 References

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15.3.4 Learning Outcome 3: Demonstrate understanding in nutrition management of respiratory and febrile disorders

15.3.4.1 Learning Activities

Learning Activities	Special instructions
1. Identify and describe terminologies under respiratory and febrile disorders as per resource materials, policies and guidelines	• Use terminologies in respiratory and febrile disorders • Apply knowledge of the respiratory system in respiratory disease management
2. Identify and describe disorders of upper, lower respiratory tract, febrile disorders and their nutrition management as per resource materials, policies and guidelines	• Plan and implement a diet plan for respiratory and febrile disorders • Apply existing guidelines and policies and in management I management of respiratory and febrile disorders

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15.3.4.2 Information Sheet

Cough

Cough is caused by foreign or irritating substances in the bronchial tubes. It is the body's defense mechanism to expel foreign or irritating substances from the bronchial tubes. It is the most common symptom of a respiratory disease.

Aim of nutrition management

- To boost the body's immune system
- relieve the cough

Nutrition Management of Coughs

- Intake of lemon juice with honey which is a traditional remedy for coughs is recommended
- Provide foods rich in Vitamin A as it is vital for healthy bronchial mucosa and helps relieve cough
- Provide foods rich in vitamin C as it boosts body's immunity to effectively fight infections
- Reduce intake of salt as it may cause fluid retention in the respiratory system hence aggravate cough

- Reduce intake of dairy products as they may increase mucous production in the respiratory tract which can trigger or aggravate cough

Bronchitis

This is the inflammation of the mucosa lining the bronchial passages. Bronchitis is caused by infections and is exacerbated by inhalation of irritant fumes such as tobacco smoke.

Symptom

- Cough and expulsion of mucus

Aim of Nutritional management

- To aid expulsion of mucous
- To relieve the cough

Nutritional Management

- Use of mucolytics such as onions, leek and radishes is recommended
- Provide emollients such as okra, dates and figs as they soften and reduce inflammation in the respiratory mucosa
- Use of foods with antibiotic and antiseptic properties such as garlic and propolis is recommended as they combat bacteria and viruses that cause or aggravate bronchitis
- Encourage intake of lemon juice with honey which is a traditional remedy for coughs
- Provide foods which are rich in vitamin A as it is vital for healthy bronchial mucosa and helps relieve cough

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TUBERCULOSIS (TB)

Tuberculosis (TB) is caused by bacteria known as *Mycobacterium typhi.* TB can affect several body parts including lungs, spine, and bones among others. Nutrition is a principal determinant of morbidity and mortality from tuberculosis. TB increases as one passes from well-to-do to poor populations. There is good epidemiological and clinical evidence that malnutrition contributes up to 60% of both the incidence and severity of tuberculosis. Together with poverty, overcrowding and HIV, poor nutrition has contributed to a global problem of TB "TRIPPLE TROUBLE", i.e. Malnutrition, TB and HIV.

Symptoms associated with TB

- Cough lasting 2 weeks or more
- Fever/night sweat-which increase calorie requirement (10% extra calorie per every 1°c rise in body temperature
- Loss of appetite-compromises nutrient intake leading to poor nutritional status

- Weight loss-compromise health and nutritional status predisposing the clients to frequent, prolonged and severe infections due to impaired immunity
- Blood in the sputum-increase energy demand and loss of blood/iron predisposing the clients to anaemia and other infections
- Oozing matted lymph nodes or enlarged lymph nodes-increase protein/micronutrients requirement for tissue repair
- Breathlessness and fatigue – pulmonary effusion, pericarditis-increases energy need

Nutrition implications of TB

- Reduced protein synthesis and metabolism
- Nutrient deficiency
- Reduced immunity
- Reduced food and nutrient intake
- Increased nutrient requirements

Note: *Nutrition status is a principal determinant of morbidity and mortality from tuberculosis*

Objectives of Nutrition Care and Management of TB patients

The general objectives in nutritional care and management of TB patients are;

- Maintain good nutrition status
- Prevent and control body wasting and weakness
- Correct nutritional deficiencies which may have occurred during the disease
- Modify diets to the body's ability to metabolize nutrients during TB disease
- Accelerate healing process

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Nutrient Requirements and Dietary management

Energy

Most patients with chronic tuberculosis are malnourished, energy needs are increased in order to minimize weight loss and achieve a desirable weight. An additional 300- 500 kcal (35 -40 kcal per ideal body weight) is recommended. This will help in protein sparing.

Protein

An intake of 1.2- 1.5 g of protein per kg body weight is required to generate serum albumin levels per day, due to tissue wasting and repair of worn out tissues.

Fats/ oils

These should provide 25-30% or less of the total energy requirements of an individual.

Vitamins and minerals

The body should be provided with liberal amounts of vitamins and minerals. In TB conversion of beta carotene to retinol is affected in the intestinal mucosa. The client should be supplemented with vitamin A (as per the National Vitamin A supplementation schedule) and encouraged to eat vitamin A rich foods.

Patients on isoniazid should ideally be supplemented with 10mg of pyridoxine B6 daily since the drug inhibits its absorption. Additional amounts of vitamin C is recommended in the diet to facilitate healing of lesions. Other antioxidants (Vit A, C, and E, folic acid, zinc and selenium) neutralize free radicals and prevent the production of peroxides from lipids.

Water

At least 8 glasses (250ml) or more of safe drinking water per day

Food/Nutrient Based Interventions for TB Patients

Without malnutrition or with mild malnutrition; provide nutrition education and counseling on good nutrition practices (CNP), follow-up and closely monitor

Moderate malnutrition; provide nutrition education and counseling, food and multiple micronutrients and conduct regular monitoring and follow-up

Severe acute malnutrition without complications; provide therapeutic feeds, nutrition education and counseling and close monitoring and follow-up (weekly)

Severe acute malnutrition with complications; admit for in-patient stabilization and management of severe malnutrition and close monitoring and follow-up (Daily)

Other interventions in nutrition management of TB include; regular de-worming, vitamin A supplementation as per national schedule, targeted multiple micro nutrient supplementations, health and nutrition education and counseling along CB-DOTS

Side Effects related to TB drugs and food intake recommendations to minimize them

Drug name	Food recommendation	avoid	Possible side effects
Rifampicin	To be taken I hr before or 2 after food. I hr before antacids	Alcohol	Nausea, vomiting, appetite loss
Isoniazid	Taken 1 hr before or 2 hrs after food. Give 10mg B_6 daily	Alcohol	Interferes with
Ethambutol	May be taken with food	Avoid alcohol	
Streptomycin	Increase fluid intake		Taste changes, taste of food, nausea
Pyrazinamide	May be taken with food		
Ethionamide	Take with or after meals(Supplement with Vit B_6)	Alcohol	Abdominal discomforts, nausea
Ofloxacin	Take 2hrs before or after food	Antacids, milk products	

Kanamycin	Can be taken without regard to food		
Capreomycin	Increase fluid intake, take with foods high in potassium (bananas, avocados)		
Para-aminosalicylic acid (PAS)	Take with or immediately after food. Increase fluid intake	Alcohol	
Cycloserine	Supplement with vitamin B_6	alcohol	

ASTHMA

This is a condition which manifest with attacks of dyspnea (difficult breathing) accompanied by wheezing, cough, expectoration and chest pressure. Asthma is caused by allergic reactions.

Symptoms/implications

- Cough
- Wheezing
- Expectoration
- Chest pressure

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Aim of nutrition management

- To relieve and prevent asthma attack

Nutrition Management

- Provide antioxidants such as vitamins A, C and E as they enhance bronchial tubes' ability to withstand free radicals coming from environmental pollution
- Provide honey as it contains some pollen which can desensitize the body against environmental pollen
- Encourage consumption of onions. Onion is a bronchial dilator and antispasmodic which can relieve and prevent asthma attacks
- Reduce intake of food additives, salt, wine, beer and fish. Fish contains histamine which provokes all allergic reactions

15.3.4.3 Self-Assessment

1. Describe the nutritional management of chronic cough
2. Outline the symptoms of asthma
3. Explain the nutrition implications of asthma
4. Foods which are rich in _____as it is vital for healthy bronchial mucosa and helps relieve cough
   A. Vitamin A
   B. Calcium
   C. Vitamin E
   D. Zinc
5. The following are nutrition implications of TB except:
   A. Nutrient deficiency
   B. Reduced immunity
   C. Reduced food and nutrient intake
   D. Reduced nutrient requirements
6. Which one of the following is a side-effect of Rifampicin in management of TB?
   A. Taste changes
   B. Nausea
   C. Vitamin loss
   D. Abdominal discomforts
7. Which one of the following is not true about the nutritional management of asthma?
   A. Consume food rich in antioxidants such as vitamins a, c and e
   B. Avoid honey
   C. Encourage consumption of onions.
   D. Reduce intake of food additives, salt, wine, beer and fish.
8. _____is the inflammation of the mucosa lining the bronchial passages.
   A. Asthma
   B. Bronchitis
   C. Tuberculosis
   D. Cough

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15.3.4.4 Tools, Equipment, Supplies and Materials

- Food exchange list
- Reference manual
- Drug diet interaction reference
- Calculator
- Stationery (Pen, Paper, referral notes, File)
- WHO guidelines
- MOH guidelines
- Ministry of Education
- Skills lab
- Use of LCDs, video clips, charts and other teaching aids
- Invitation of competent expertise
- Computers with internet
- Library and resource centre

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15.3.4.5 References

Anyang'Nyong'o, H. P. P., & EGH, M. Kenya National Clinical Nutrition And Dietetics Reference Manual First Edition.

15.3.5 Learning Outcome 4: Demonstrate understanding in nutritional management of cancers

15.3.5.1 Learning Activities

Learning Activities	Special instructions
• Identify and describe terminologies in cancers as per resource materials, policies and guidelines	• Use terminologies related to cancer
• Identify and describe pathophysiology of cancers as per resource materials, policies and guidelines	• Consider the pathophysiology of cancers
• Identify and describe types of cancers as per resource materials, policies and guidelines	• Observe how different types of cancers affect nutrition
• Identify and describe etiology of cancers as per resource materials, policies and guidelines	• Consider nutritional and non-nutritional factors associated with cancer
• Identify and describe cancer treatment and nutrition implications as per resource materials, policies and guidelines	• Consider cancer treatment options and their effect on nutrition and health • Observe nutritional implications in cancer • Plan diet for cancer patient

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15.3.5.2 Information Sheet

Definition of common terms

Cancer: abnormal division and reproduction of cells that can spread throughout the body, crowding our normal cells and tissues

Carcinoma: type of cancer that develops from the epithelial cells of the skin and the tissue lining internal organs like liver & kidneys

Neoplasm: a new and abnormal formation of tissue that serves no useful function; new growth

Sarcoma: a malignant tumour of connective tissue (such as fat and muscle). or other non-epithelial tissue such as bones and connective tissue

Tumor: a solid cancer that causes a swelling or a lump; commonly defined as a malignant neoplasm; it is also a swelling caused by neoplasm

Cancer cachexia: weight loss and lessening of the body's fat and muscle stores that accompany advanced cancer, even with adequate nutrition; may be related to elevated levels of tumor necrosis factor

Carcinogen: an agent (physical, chemical, or viral) that induces cancer in humans and animals

Chemotherapy: the use of chemical agents (rytotoxics, immunologic preparations, hormonals) or medications to prevent the development, maturation, or spread of neoplastic cells

Radiation therapy: use of high-energy rays (ionizing radiation) in multiple fractionated doses to cure, control, or palliate cancer

Metastasis: growth of malignant tissue that spreads to surrounding tissues or organs

Mutation: a permanent change in the gene sequence either due to mistakes when the DNA is copied or as the result of environmental factors such as UV light and cigarette smoke

Benign neoplasm: one which is restricted by its capsule- doesn't spread to other parts of the body

Malignant neoplasm: one which spreads to different parts of the body

Cancer is a general name for more than 100 different diseases in which abnormal cells multiply and divide uncontrollably in the body.

These abnormal cells form malignant growths called tumors.

The common point about all these different diseases is that a particular cell of the body is growing out of control.

Cancer cells do not know "what to do, and when to do"

This division uses up all the resources required by other cells of the body

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How Cancer Develops

It's a disease that results from abnormal cell division. The genes in a healthy body work together to regulate cell division and ensure that each new cell is a replica of the parent cell

In this way the healthy body grows releasing dead cells and repairing the damaged ones

Cancers develop from mutations in the genes that regulate cell division. These mutations silence the gene that ordinarily monitors the errors created by replicating DNA. The affected cells thereby lose their built –in brakes for halting cell division.

Cancer is generally named for whatever body part it originates in or the type of tissue it first infects. For instance:

- Adenocarcinomas: found in glandular tissue.
- Sarcomas: found in connective tissue.
- Adenosarcomas: can be found in both gland tissues and connective tissues.
- Leukemias: cancers that affect blood cells.
- Lymphomas: affect the lymph nodes.

Types of Cancer

1. **Throat cancer**

This refers to cancerous tumors that develop in the throat (pharynx), voice box (larynx) or tonsils.

They include;

- **Nasopharyngeal cancer begins in the nasopharynx** : the part of the throat just behind your nose.
- **Hypo pharyngeal cancer (laryngopharyngeal cancer)**: begins in the lower part of the throat, just above the esophagus and windpipe.
- **Glottis cancer:** begins in the vocal cords.
- **Supra glottic cancer** begins in upper portion of the larynx & includes cancer that affects the epiglottis (that blocks food from going into the windpipe).

2. **Ovarian cancer**

It is the most common type of adenocarcinomas that starts from epithelial cells –gland forming cells. Other adenocarcinomas include; those found in the breast, colon, lung, prostate, uterus, sometimes cervix

3. **Breast Cancer**

It is a cancer that develops from breast tissues. In this cancer, cells in the breast grows out of control.

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4. **Colon cancer**

This is cancer of the large intestine (colon), the lower part of your digestive system.

5. **Rectal cancer**

It is cancer of the last several inches of the colon.

6. **Colorectal cancer**

It is a cancer that starts in the colon or the rectum. These cancers can also be named colon cancer or rectal cancer, depending on where they start.

7. Ce**rvical cancer**

A malignant tumor deriving from cells of cervix uteri, which is the lower part, the neck of the womb, the female reproductive organ.

Causes of Cancer Development

1. **Mutation or genetic factors**: all cancers have a genetic component in that a mutation causes abnormal cell growth but some cancers have a genetically inherited components as well e.g a person with a family history of colon cancer has a greater risk of developing cancer than a person without such genetic predisposition. This does not mean however the person will develops cancer only that the risk is greater.

2. **Radiation**: Ultraviolent radiation in sunlight and tanning lamps is most likely responsible for the dramatic increase seen in skin cancer in the past several years. Another natural source of radiation is radon gas

3. **Onchogenic Viruses:** DNA viruses such as hepatitis B virus, Epstein-Bar virus and human Papillomavirus - have been linked to human cancer. In china for example almost all people have been infected with the hepatitis B virus and this correlates with the high incidence of liver cancer in that country.

4. **Organic chemicals**: examples of organic chemical that can be carcinogenic include pollutants, certain hormones, food, and tobacco smoke.

   a) **Tobacco smoke:** Tobacco smoke is contains several organic chemicals referred to as carcinogens. Smoking is linked to the development of various forms of cancer such as cancer of the pancreases, kidney, bladder, larynx and mouth. The higher the number of cigarette an individual smokes per day, the earlier the habit starts and the higher the tar content the more likely it is that cancer will develop

   A combination of smoking and alcohol drinking increases the risk of developing cancer. Furthermore, inhalation or passive smoking of other people tobacco smoke is dangerous and it is a probable cause of a few thousands deaths every year.

   b) **Foods (fast foods) and hormones**

   Scientific experimentation involving animal testing on certain food additives such as red dye II when used in high doses cause cancer. In humans, fats and salty food appear to contribute significantly to cancer.

   Furthermore, some studies investigating hormone replacement therapy are suggesting that it is playing a role in the development of breast and uterine cancer in women who have used the hormone for a period of 5 to 10 years.

   Cooking (charring) of meat produces two types of carcinogens;

   i) Polycyclic aromatic hydrocarbons (PAHs)

   ii) Heterocyclic amines (HCAs).

   c) **Pollutants**

   Industrial chemical such as benzene and carbon tetrachloride and industrial materials such as vinyl chloride and asbestos.

5. **Stress factors:** Physiological stress refers to the emotional and physiological relation experienced when an individual confronts a situation in which the demands go beyond their coping resources e.g. stressful situations like marital problems death of loved ones health problems and financial crisis. The body responds to stress by releasing stress hormones such as epinephrine (Adrenaline) Cortison (hydroecortision). The body produces these stress hormones to help a person react to a situation with more speed and strength. Stress hormones increases BP, heart rate and blood sugar levels. Stress that is chronic increases the risk of obesity heart disease depression and various other illnesses. Stress can also lead to unhealthy behavior such as overeating smoking or abusing drugs or alcohol that affects the cancer risks

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6. **Obesity:** obesity has been associated with increased risk for colon, rectum, esophagus, liver, pancreas, kidney, gall bladder, uterus, postmenopausal breast, cervical, ovary, stomach and prostate cancers..

Lifestyle factors associated with increased cancer risk

Dietary Factor	Cancer
Overweight & Obesity	Esophagus, pancreas, colorectal, breast (postmenopausal), endometrial, kidney
Alcohol	Oral cavity, esophagus, Liver, colorectal, breast
Salted foods	Stomach, nasopharynx
Red meat	Colorectal
Aflatoxin	Liver
Griled/BBQ Foods	Colorectal, stomach
Very hot foods & drinks	Oral cavity, esophagus

Signs and symptoms of cancer

- Evident adjustment in bowel and bladder habits.
- Visible sore that seem not to heal
- A lump or thickening in any part of the body
- Swallowing difficulties or chronic indigestion
- Variation in a wart or mole
- A continuous cough or consistent hoarse voice

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Nutritional implications/consequences of cancer

Two major effects;

i) Changes in eating habits and eating behavior
   - Patient may eat less
   - Alteration of taste hence some foods are less appealing
   - Aggravated dietary problems e.g. food sensitivity

ii) Alteration in the manner in which the body utilizes nutrients. This may be due to;
   - Certain medication
   - Side effects of treatment
   - Body response to tumor

Implications of Cancer

i) **Complications:** Tumor's impingement on surrounding tissues

ii) **Cancer cachexia:** severe malnutrition, anorexia, muscle wasting, weight loss, anemia, and fatigue

iii) **Metabolic changes:**

- Enhanced turnover rates of protein but decreased muscle protein synthesis
- Muscle: used for glucose production
- Elevated serum lipids

iv) Anorexia and reduced food intake due to:

- Chronic nausea and early satiety
- Fatigue
- Pain
- Mental stress
- Gastrointestinal obstructions

Effects of cancer therapies

Cancer-related Defects in nutrient metabolism. The way body uses nutrients is sometimes changed in people with cancer. These changes may be caused by the;

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- Body's response to the tumor
- Side effects of treatment
- Certain medications
- Combination of the above reasons
- Cancer-related defects in carbohydrate metabolism
- Glucose intolerance
- Insulin resistance
- Abnormal insulin secretion
- Delayed glucose clearance
- Increased glucose production
- Cancer-related defects in fat metabolism
- Excess body fat depletion relative to protein loss/ increased lipolysis
- Decreased free fatty acids, and glycerol turnover/decreased lipogenesis
- Hyperlipidemia
- Decreased serum lipoprotein lipase activity
- Cancer-related Defects in Protein metabolism

- Increased whole-body protein turnover
- Persistent muscle protein breakdown/increased catabolism
- Decreased plasma branched-chain amino acids
- Decrease in protein synthesis
- Negative nitrogen balance
- Malnutrition and cancer

Cancer and its associated oncological treatment cause symptoms that increase the likelihood of a patient to suffer from malnutrition. The resultant effects have negative effects on patients health. Some of these effects include:

- A decline in patient's quality of life
- Minimizing tolerance to the oncology treatment
- Rising the number of complications

Malnutrition is a common problem in cancer patients that has been recognized as an important component of adverse outcomes, including;

- Increased morbidity and mortality
- Decreased quality of life
- Diminished tolerance to therapy
- Lower survival rates
- Longer hospitalization

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Management of Cancer

1. **Medical Management**
   - Surgery
   - Radiation
   - Chemotherapy
   - Immunotherapy
   - Marrow transplantation
2. **Nutrition Management**
   - Prevent or correct nutrition deficiency
   - Minimize weight loss
   - Oral feeding
   - Enteral tube feeding
   - Parenteral feeding.

Nutrition care support for cancer patients

Individuals living with cancer have three main goals:

i) Maintaining a healthy weight

ii) Select and eat healthy diets that provide the body with nutrients and fuel needed for healing and repairing

iii) To avoid reappearance of cancer and the emergence of second malignancy

Nutrition care support for cancer patients

Good nutrition practices can help cancer patients to:

- Maintain weight
- Maintain body's nutrition stores
- Improving quality of life.

Nutrition support plays a major goal in two main areas:

i) Curative oncology care

ii) Palliative care.

In curative oncology care, nutrition contributes to:

i) Reduced postoperative infection rate

ii) Better control of cancer-related symptoms

iii) Shortened length of hospital stay

iv) Improved tolerance to treatment

In palliative care, the nutritional intervention focuses on controlling symptoms, thus improving quality of life.

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Treatment

Cancer cells are our cells. Killing them=killing ourselves. The main treatments available include

i) Surgery – recurs

ii) Chemotherapy – damages normal cells

iii) Radiotherapy – damages nearby cells. Still, prevention is cure

iv) Limiting tobacco exposure

v) Limiting alcohol intake

vi) Modifying diet

vii) Limiting exposure to UV rays

viii) Screening programs - When abnormal tissue is found early stage, it may be possible to treat it completely.

How cancer treatment may affect nutrition

1. **Surgery:** Often the preferred treatment for tumors that haven't spread. Tumor and any nearby tissue that may contain cancer cells are removed. The surgery decision depends on type of cancer, location and the extent it has spread to other body parts. Surgery can cause temporary or permanent nutritional challenges.

Nutritional considerations for surgery

• The operation itself will increase the need for calories to do the extra work of healing

- Increase caloric and protein intake for healing
- Address the issues of long term nutritional problems in case of GI resection
- Address any challenges of chewing and swallowing as well as poor absorption of nutrients in the intestines

2. **Radiation Therapy:** High nervy waves are used to damage cancer cells inhibiting their inability to multiply. Common problems associated with this form of treatment include;

- Irritation of the mouth, tongue and throat
- Milk intolerance
- Nausea
- Vomiting
- Diarrhea

Later problems include:

- Dry mouth
- Narrowing of esophagus
- Malabsorption of nutrients
- Abdominal discomfort
- Diarrhea
- Constipation

3. **Chemotherapy:** It uses of drugs to destroy cancer cells by disrupting their ability to grow and multiply. However, it is systematic in that it can affect the whole body rather than a given part. Some of its major effect include

- Nausea
- Vomiting
- Hair loss
- Fatigue

Other effects include:

- Constipation or diarrhea
- Change in taste
- Infection
- Bleeding
- Anemia

Several factors that adversely affect nutrition include:

- The cancer itself
- The treatment modality prescribed (including chemotherapy, radiation therapy, and surgery)
- The current health and nutrition status of the individual.

Every years, scientific data reveal that a third of cancer death in united states are attributed to lifestyle and nutritional behaviors such as alcohol use, obesity, overweight, physical inactivity and poor diet. Furthermore, tobacco user and cigarettes smoking is also attributed to another third of cancer deaths

Common mineral and vitamin deficiencies experienced by cancer patients include:

- Folate
- Copper
- Zinc
- Vitamin A
- Iron
- Calcium
- Vitamin C
- Magnesium
- Vitamin D

Diet recommendations for cancer survivors

Cancer survivor may harbor undetected primary or disseminated cancer cells. A "cured" cancer patient is at increased risk for other primary cancers in the same organ or other organ. General dietary guidelines are also appropriate for recovering cancer patient. Dietary regimens should avoid stimulating growth, spread of remaining tumor cells, and provide maximum prevention against new primary tumors. Diet recommendations for cancer survivors include:

- Limit total fat intake to 15-20% of total calories. Monounsaturated fats are preferred.
- Aim for 10-12 daily servings of a variety of whole vegetables and fruits.
- Consume 4-6 servings of whole grains daily.
- Breast cancer patients should eliminate or severely restrict alcohol intake
- Consider a Vitamin E supplement of 200 IU/day to replace deficit from reduced fat intake
- Standard dose multivit daily (not to exceed 100% RDA). This does not replace cancer fighting foods
- Exercise moderately (30 minute daily walk, for example)
- Maintain desirable body weight
- Enteral and parenteral nutrition support

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In general, parenteral and tube feedings nutrition are not continuously recommended to adequately nourished cancer patients unable to eat. Nonetheless these approaches are vital to retain status when a patient is thoroughly malnourished or anorexia persist and is about to undergo serious cancer remedy.

How To Help Patients Handle Food Related Problems

In people with cancer, many different problems can interfere with their eating. Health care providers should try to identify the specific problems that patients are having and offer appropriate solutions such as explaining why eating appropriately can help to improve their health. Not all of the suggestions will work for each patient but you should encourage patient's to experiment and find the ones that work best

Problems & solutions

1. **Lack of appetite**: Take small frequent meals, indulge in favorite foods throughout the day, take fruits, serve foods attractively, eat most food at time of day you feel the best, eat with family and friends in a relaxed environment.

2. **Taste alterations**: Brush your teeth or use mouth wash before you eat, add sauces and seasonings to meats, and experiment with herbs and spies
3. **Nausea and vomiting**: Take small but frequent meals, avoid fatty or greasy foods, and suck lemon when you feel nausea. When you experience vomiting, use clear liquids like broths and juices to replace lost electrolytes. If nauseated from chemotherapy, avoid eating at least 2 hours before treatment to avoid vomiting. Chewing and swallowing-take soft diet by changing consistency to the one that suits best. Drink fluids with meals to ease chewing and swallowing. Add sauces and gravies to dry foods. Tilt the head forward and backward to see if one can swallow easily with the head positioned differently.
4. **Mouth sores**: Avoid irritating foods i.e. hot or spicy foods use cold or frozen foods because they are often soothing e.g. ice cream, milk shakes, bananas, mashed potatoes macaroni and cheese. Avoid foods like seeds that can be tracked in the sore and raw vegetables and toast use a straw for drinking liquids to bypass the sores.
5. **Dry mouth**: Rinse their mouth with warm salty water or mouthwash frequently and drink liquids between meals. Use sour candy or gum to stimulate the flow of saliva brush your teeth and floss to prevent cavities and oral infections
6. **Diarrhea**: Patients should be encouraged to drink enough fluids to replace lost fluids and electrolytes e.g. salty soups, broths diluted fruit juice, and sport drinks are good choices for severe diarrhea. Try commercially prepared ORS. Avoid high fat foods and foods made with sugar and fructose. Eat smaller meals but frequently take lactase enzyme replacement when you use milk because you may also experience lactose intolerance while you are having diarrhea or take low fat yoghurt
7. **Constipation**: Take foods rich in fiber eat wholegrain breads and cereals nuts, fresh fruits and raw vegetables. Avoid refined CHO e.g. white bread, white rice and pasta avoid use laxatives e.g. ENO or Actal, instead, take plenty of fluids, exercise regularly

Gastric dumping syndrome or gastric emptingit is a condition where ingested foods bypass the stomach too rapidly and enter the small intestines largely indigested. It happens when the small intestines expands too quickly due to the presence of hyperosmolar (having increased osmolarity) food from the stomach.

Guidelines for cancer prevention

- Select a diet that is inclusive of a variety of plant-based foods.
- Eat plenty of fruits and vegetables
- Be physically active and maintain a healthy weight
- Drink alcohol only in moderation, if at all.
- Select foods low in fat and salt.
- Limit intake of red meat and avoid processed meat
- Prepare and store food safely. Avoid mouldy grains or legumes
- Aim to meet nutritional needs through diet alone rather than supplements
- Mothers to breastfeed; children to be breastfed

- For cancer survivors: follow the recommendations for cancer prevention
- Patients should be advised to avoid using tobacco in any form.

CASE STUDY

Design a diet plan for a cancer patient, aged 42 years who was diagnosed with CA oesophagus, who is feeding through gastrostomy tube. She weighs 54 kg.

I. Describe the process of tumor formation

II. Discuss factors that contribute to cancer development

III. What is cancer cachexia?

IV. Explain how cancer and its treatments can cause alterations in food intake and metabolism and possibly lead to malnutrition

V. Discuss the elements of medical nutrition therapy for cancer as well as strategies that can improve food intake

15.3.5.3 Self-Assessment

1. Identify five signs of cancer
2. List common mineral and vitamin deficiencies experienced by cancer patients
3. Discuss the management of the following nutrition related problems:
    A. weight loss and loss of appetite
    B. weight gain
    C. diarrhea
    D. constipation
    E. nausea
    F. food odors
    G. vomiting
4. _____ is a type of cancer that develops from the epithelial cells of the skin and the tissue lining internal organs like liver & kidneys
    A. Tumor
    B. Carcinoma
    C. Sarcoma
    D. Carcinogen

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5. State whether the following statements are TRUE or FALSE

   A. Family history of cancer does not increase the risk of developing cancer

   B. Smoking and alcohol drinking increases the risk of developing cancer.

   C. Adjustment in bowel and bladder habits maybe a symptom of cancer

   D. One should limit intake of red meat and avoid processed meat to prevent cancer

15.3.5.4 Tools, Equipment, Supplies and Materials

- Charts
- Food models
- WHO guidelines
- MOH guidelines
- Ministry of Education
- Skills lab
- Use of LCDs, video clips, charts and other teaching aids
- Invitation of competent expertise
- Computers with internet
- Library and resource centre

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15.3.6 Learning Outcome 5: Demonstrate understanding in nutritional management of HIV and AIDS

15.3.6.1 Learning Activities

Learning Activities	Special instructions
1. Identify and describe terminologies in HIV and AIDS as per resource materials, policies and guidelines	• Use terminologies in HIV/AIDS
2. Identify and describe the relationship between malnutrition and HIV and AIDS, and the roles of nutrition in management of HIV and AIDS Terminologies in cancers as per resource materials, policies and guidelines	• Consider the relationship between malnutrition and HIV/AIDS • Consider the role of malnutrition in HIV and AIDS management • Prevent malnutrition in people living with HIV/AIDS • Manage malnutrition in HIV/AIDS
3. Identify and describe oopportunistic infections and their nutritional management as per resource materials, policies and guidelines	• Consider opportunistic infections and their implications on nutrition • Plan a diet for the management of opportunistic infections
4. Demonstrate knowledge on Infant and young child feeding in the context of HIV and AIDS per resource materials, policies and guidelines	• Apply guidelines for infant and young child feeding in the context of HIV and AIDS
5. Demonstrate knowledge on nutrient drug interactions in ART as per resource materials, policies and guidelines	• Manage nutrient drug interactions • Modify diet to mitigate food-drug interactions

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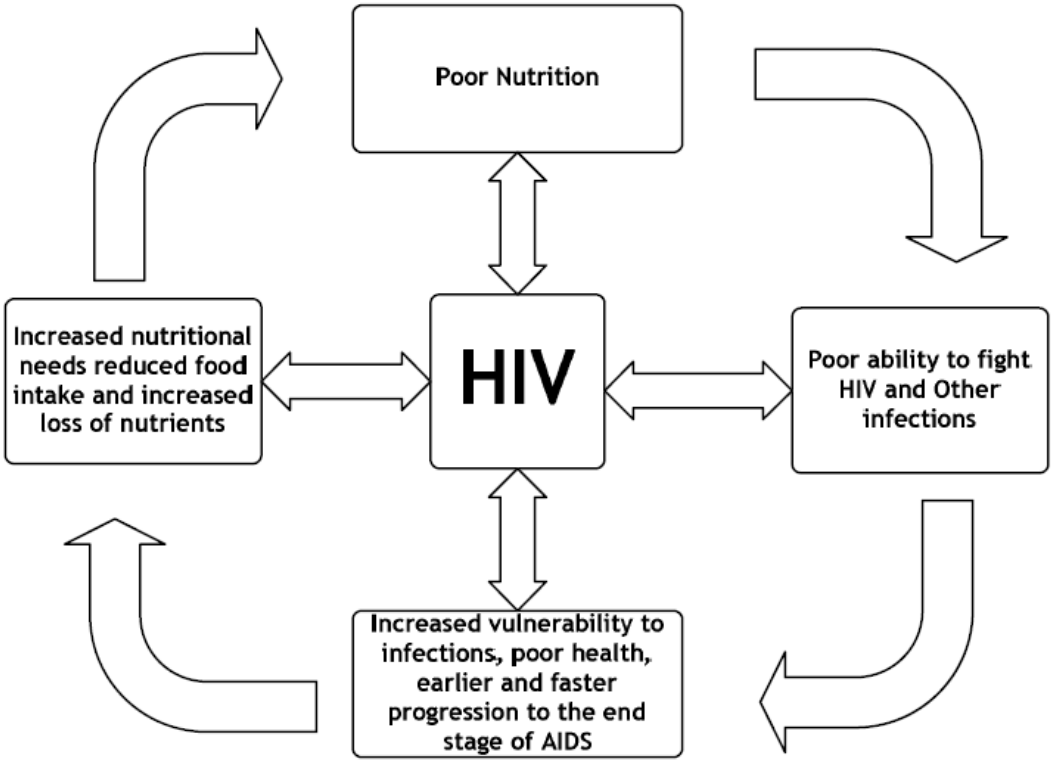
15.3.6.2 Information Sheet

HIV/AIDS and nutrition are strongly interrelated. Malnutrition can quicken the progression of HIV and HIV can lead to malnutrition. A vicious cycle is created by the relationship between HIV/AIDS and malnutrition because HIV weakens immune system. In turn, this results in more infections. Infections have ability to cause anorexia and increase energy needs. Furthermore, high levels of infections (in severity and number) result in inadequate food intake, loss of appetite and finally malnutrition. Malnourished individuals are at a higher more risk of infections exposing them to HIV and the cycle continues.



The Cycle of Nutrition and Infection in the context of HIV/AIDS

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In light of the HIV and nutrition vicious cycle, it is imperative that nutrition interventions are put in place to slow disease progression and improve the individual's immunity.

HIV can be transmitted through various ways such as:

- Transfusion of blood infected with the virus
- Having unprotected sexual intercourse with an infected person
- Use of contaminated needles and injections/skin pricking instruments
- Vertical transmission from infected mothers to child during pregnancy,
- delivery or through breastfeeding

Implications

- Suppressed body immunity
- Increased susceptibility to infections
- Altered metabolism-high catabolic rate
- Decreased body cell mass
- Malnutrition
- Altered body weight (overweight or underweight)

Aims of Nutritional Management

- Maintain and improve nutrition status of a person living with HIV/ AIDS thus delay the progression from HIV to AIDS related diseases
- Ensure adequate intake of all nutrients thus preventing development of nutritional deficiencies
- Preservation of lean body mass
- Maintain body weight and fitness
- Improve performance of immune system
- Replenishment of nutrient losses incurred during infection
- Minimizing symptoms of malabsorption
- Regeneration of glycogen stores
- Maintain laboratory values within normal limits
- Control side effects due to medication—refer to the section on drug-nutrient interaction

An efficient support and nutritional program improves the quality of life for PLWHA by:

- Maintaining body strength and weight
- restoring lost minerals and vitamins
- Enhancing the role of body's ability to fight infection and the immune system.
- Lengthening the duration from infection to development of the AIDS disease.
- Enhancing response to medication by reducing money and time spent on health care.
- Sustaining HIV infected individuals active by giving them an opportunity to take care of themselves, their children and family.

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Nutrient requirements for PLHIV

People living with HIV exhibit increased nutrients need due to:

- Nutrient malabsorption
- Increased resting energy equilibrium (REE)
- Viral load
- Opportunistic infections (OIs) that extend energy need

Nutrition Requirements in HIV/AIDS

Energy Requirements by Disease Stage

Population group	HIV phase	Energy requirements
Adult	Asymptomatic	10% (200-260kcal)increase (eq. to 1 mug thick enriched porridge)
	Symptomatic	20-30% (420-630kcal) increase (eq. 2-3 mugs of thick enriched porridge).
Pregnant/lactating women	Asymptomatic	10% increase
	Symptomatic	20-30% increase
Children	Asymptomatic	10% increase
	Symptomatic (with no weight loss)	20-30% increase
	Symptomatic (with weight loss)	50-100% increase

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Protein Needs

The World Health Organization maintains that HIV infected people should not increase their protein intake. Rather, they have similar protein intake just like healthy non-HUIV infected adults. Generally, for a healthy non-HIV infected adult, the recommended protein intake is 12-15% of the total energy or 0.85g/Kg for males and 0.8g/Kg for females. However, there are certain factors that are likely to increase protein need such as pressure, ulcers, trauma, infection, surgery or illness. Hence, it is a necessity to consider initial and concurrent protein deficiencies.

Furthermore, proteins are used to provide body with energy on condition that energy intake is not limited. This implies that the body will have fewer protein required to strengthen and maintain muscle tissue while children will have less protein necessary for development and growth. Hence, having enough energy intake is important at all times specifically during infections. In this manner, proteins may be utilized in maintaining and building lean muscles as well as strengthening the immune system

Fat Needs

The World Health Organization maintains that HIV infected persons should not have an increased fat intake than the one recommended for healthy non-HIV infected people. Dietary fats is a good origin of concentrated energy, vitamins and essential fat. Furthermore, fat plays an important role to in catering for increased energy requirements provide that the patient is not having diarrhea and fat malabsorption. However, the World Health Organization Technical Advisory Group on nutrition and HIV/AIDS observed that personalized advice concerning fat intake is necessary on person with persistent diarrhea and ones on anti-retroviral therapy. In general, the recommended fat intake for healthy adult should be less than 30% of the total energy required

Micronutrients

Individuals infected with HIV have micronutrients deficiency in mineral such as selenium, iron zinc and Vitamin A, C, E, B6, B12 and folate due to excessive loss in urine. Rectifying these deficiencies when they exist play a major role in slowing down the progression of the disease

Critical Nutrition Interventions for PLWHA

1. Advise the patient to have occasional nutritional assessment status specifically of their weight; after every 2nd month for symptomatic patients and after every 4th month for asymptotic patients
2. Counsel and educate PLWHA about the heightened energy requirements for their disease stage and the necessity of consuming balanced diets. Patients with serious malnutrition should be supported with therapeutic supplementary diets
3. Support and educate patients on the need to always maintain high degrees of food hygiene, sanitation and safety
4. Advice the patients to maintain engage in positive living behaviors such as practicing save sex, avoiding non-prescribed drugs and cigarettes as well as use moderate or avoid alcohol
5. Encourage patients to engage in physical exercises or activities in order they improve their health, increase their appetite and build their muscles
6. Encourage patients to drink plenty of safe water and use clean and safe water while taking their medication
7. Advise patients to seek immediate treatment incase on opportunistic symptoms and infections especially those that inhibit their food intake
8. Advise those under medication (ARV) on the need to manage the food-drug interaction and the reactions that can be managed by nutrition and food interactions

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Management of Common problems on Food intake in HIV/AIDS

Condition	Management
Loss of appetite	• Minimize foods with strong odors. • Try different foods until you find those that you like and try to have a mixed diet • Encourage intake of small frequent meals more often • Use spices and seasonings to improve food aroma and taste. Squeeze some lemon juice over it or add spices such as cardamom, fennel, coriander and cinnamon • Encourage patients to eat food in relaxed atmosphere • Use calorie dense supplements/foods • Take light exercise such as walking outdoors • Eat in a well ventilated room away from cooking or unpleasant smells • Avoid alcohol, it reduces appetite, weakens the body and interferes with medicines Avoid fizzy drinks, beer and foods such as cabbage, broccoli and beans that create gas
Nausea and Vomiting	**General** • Sit up when eating, try not to lie down until 1hr or 2hrs after eating • Try not to prepare food yourself to avoid smell which may worsen nausea • Encourage small frequent meals. Alternating dry and fluid feeds • Drink plenty of fluids after meals • Chew food thoroughly and slowly **Recommended** • Keep drinking small amounts of water, soups and spice teas, eat soft foods and go back to solid foods when the vomiting stops • You may relieve the feeling by smelling fresh orange or lemon peel or drinking lemon juice in hot water or a herbal or ginger tea • Eat dry and salty foods such as toast, crackers and cereals • Eat promptly when hunger is first felt • Fluids should be drunk after 30 minutes after meals rather than with meals **Foods to avoid** • Fats, fatty foods and greasy foods • Highly seasoned foods • Very sweet foods • Eliminate one food at a time from the diet to see if it makes a difference
Change in taste	• Ensure your mouth is clean by brushing with a soft brush and rinsing often. Rinse your mouth before eating • Enhance taste attitude by using peppermint or sour candy • Refrain from coffee, chocolate, fried or greasy foods, and red meat

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	• Use trial and error method to determine the food that taste good and the one that is not acceptable. Note that your list of acceptable and unacceptable may temporally change • Ensure that you serve food in an attractive manner with different textures and colors to enhance appearance • You should find options to enhance the appeal and flavor for your food by using different spices
Malabsorption	• In severe malabsorption parenteral nutrition is recommend • Treat underlying cause • Based on patient's tolerance provide low fat, lactose free or low lactose caffeine free diet
Heartburn and indigestion	• Have 5 to 6 meals in a day • Put on loose clothing around the waist • Rather than lying down after meal, walk • Abstain from fried, fatty, spicy foods and beverages and foods with caffeine
Anorexia	• Refer to a counselor or psychiatrist if it is related to depression or any other psychological conditions • Use calorie dense supplements/foods
Early satiety	• Avoid serving liquids during meals. Can be taken one hour before or after meals
Diarrhea	• Encourage fluids to replace losses • Minimize insoluble fiber intake and increase soluble fiber • Refrain from using alcoholic beverages, caffeinated drinks, juices and citrus fruits • ORS may be considered to cater for electrolyte imbalance. • If severe parenteral nutrition is recommend • Treat underlying cause
Oral sores	• Use bland, cold, soft/liquid diets • Avoid acidic foods and fizzy drinks
Lactose intolerance	• Avoid milk and milk products
Fat malabsorption	• Avoid fats and fatty foods. Encourage low fat diets • Use preparations with medium chain triglycerides
Anemia	• Treat for malaria in case it is the underlying cause • If on Zidovudine hemoglobin assessment at least every 3 months is recommend • Consumption of tea & coffee should be 1 hour after or before meals • Recommend foods rich in both Iron and vitamin C
Fever	• Treat underlying cause • Encourage intake of plenty of fluids and safe water • Encourage intake of energy dense food • Ensure that you rest in a well-ventilated room with fresh air

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Muscle wasting	• In case of > 10% weight loss refer the client for assessment for ARVs • Treat underlying cause • Monitor weight monthly

Effects of HIV/AIDS on Nutrition

- Decrease in amount of food consumed. This caused by:
    - o Mouth and throat sores
    - o Reaction from medication
    - o Poverty and food insecurity in a household
- Impaired nutrient absorption, caused by:
    - o HIV infection of intestinal cells
    - o Frequent diarrhea and vomiting
    - o Opportunistic infections
- Changes in metabolism. This is caused by:
    - o Increase in energy (10-15%) requirements
    - o Infection increases demand for and utilization of antioxidant vitamins (A, C & E) and minerals (zinc, selenium, iron)
    - o Insufficient antioxidants from increased utilization causes oxidative stress

    This increases HIV replication
- Weight loss associated with HIV infection, disease progression, and mortality. This is caused by :
    - o Poor absorption of fats that affects use of fat-soluble vitamins such as A &E.
    - o Some nutrient deficiencies (Vitamins A, B12, and E, selenium and zinc) associated with HIV transmission, disease progression and mortality
    - o Leads to higher viral loads

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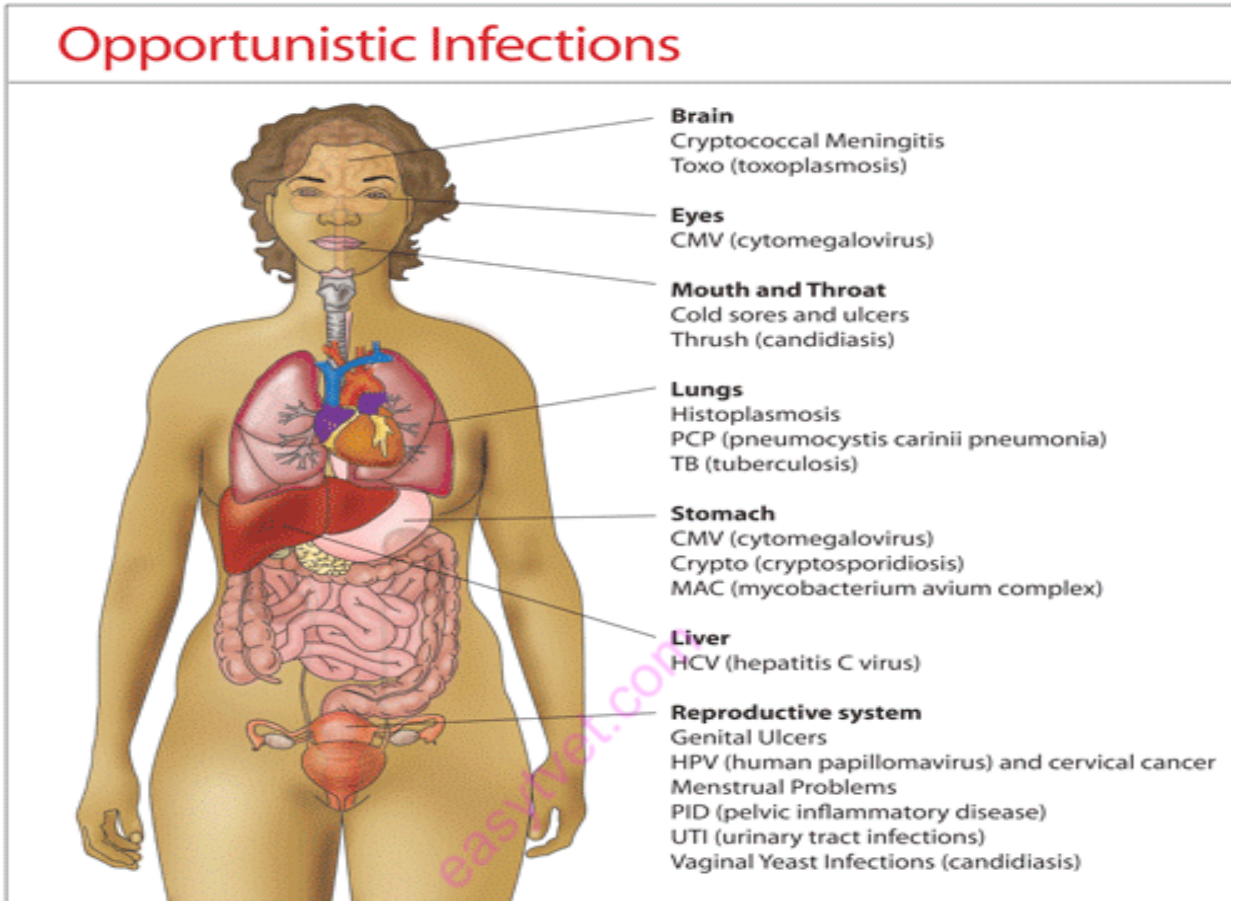
Opportunistic Infections

People with advance HIV infection are vulnerable to infections and malignancies that are called ‘opportunistic infections’ because they take advantage of the opportunity offered by weakened immune system.

Common opportunistic infections include;

- Bacterial diseases such as tuberculosis, bacterial pneumonia and septicemia (blood poisoning)
- Protozoal diseases e.g. toxoplasmosis, histoplasmosis micrporidiosis and penicilliosis
- Viral disease e.g. those caused by cytomegalo visus, herpes simplex, and herpes zoster virus

- Fungal diseases such as PCP, candidiasis, cryptococcosis and penicilliosis
- Parasites e.g. giardia, toxoplasma, strongyloides, cryptosporidium, cyclosprora
- HIV-associated malignancies e.g. Kaposi's sarcoma, lymphoma and squamous cell carcinoma.



TUBERCULOSIS (TB)

Tuberculosis (TB) is caused by bacteria known as Mycobacterium typhi.It can affect several body parts including lungs, spine, and bones among others.

It is the leading HIV-associated opportunistic infection (OI) in developing countries.

Risk of developing active TB among PLWHA is 30-50% higher than people infected with TB alone.

The bacteria are spread through air.

Effective treatment with a proper combination of anti-TB drugs makes the individual non-contagious, which prevents further spread of the TB germ.

Complete cure takes 6 to 8 months and uses a combination of antibiotics.

Isoniazid preventive therapy is recommended as a health-preserving measure for HIV-infected persons at risk of TB, as well as for those with latent TB infection.

Nutrition is a principal determinant of morbidity and mortality from tuberculosis.. There is good epidemiological and clinical evidence that malnutrition contributes up to 60% of both the incidence and severity of tuberculosis. Together with poverty, overcrowding and HIV, poor nutrition has contributed to a global problem of TB "TRIPPLE TROUBLE", i.e. Malnutrition, TB and HIV.

Symptoms Associated With TB

- Cough lasting 2 weeks or more
- Fever/night sweat-which increase calorie requirement (10% extra calorie per every 1 rise in body temperature
- Loss of appetite-compromises nutrient intake leading to poor nutritional status
- Weight loss-compromise health and nutritional status predisposing the clients to frequent, prolonged and severe infections due to impaired immunity
- Blood in the sputum-increase energy demand and loss of blood/iron predisposing the clients to anaemia and other infections
- Oozing matted lymph nodes or enlarged lymph nodes-increase protein/micronutrients requirement for tissue repair
- Breathlessness and fatigue – pulmonary effusion, pericarditis-increases energy need.

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Nutrition Implications of TB

TB affects nutrition in the following ways:

- Reduced protein synthesis and metabolism
- Nutrient deficiency
- Reduced immunity
- Reduced food and nutrient intake
- Increased nutrient requirements.

Note: Nutrition status is a principal determinant of morbidity and mortality from tuberculosis.

Objectives of Nutrition Care and Management of TB Patients

The general objectives in nutritional care and management of TB patients are;

- Maintain good nutrition status
- Prevent and control body wasting and weakness
- Correct nutritional deficiencies which may have occurred during the disease
- Modify diets to the body's ability to metabolize nutrients during TB disease
- Accelerate healing process.

Nutrient Requirements and Dietary Management

Energy:

Most patients with chronic tuberculosis are malnourished, energy needs are increased in order to minimize weight loss and achieve a desirable weight. An additional 300- 500 kcal (35 -40 kcal per ideal body weight) is recommended. This will help in protein sparing.

Protein:

An intake of 1.2- 1.5 g of protein per kg body weight is required to generate serum albumin levels per day, due to tissue wasting and repair of worn out tissues.

Fats/ oils:

These should provide 25-30% or less of the total energy requirements of an individual.

Vitamins and minerals:

The body should be provided with liberal amounts of vitamins and minerals. In TB conversion of beta carotene to retinol is affected in the intestinal mucosa. The client should be supplemented with vitamin A (as per the National Vitamin A supplementation schedule) and encouraged to eat vitamin A rich foods.

Patients on isoniazid should ideally be supplemented with 10mg of pyridoxine B6 daily since the drug inhibits its absorption. Additional amounts of vitamin C is recommended in the diet to facilitate healing of lesions. Other antioxidants (Vitamin A, C, and E, folic acid, zinc and selenium) neutralize free radicals and prevent the production of peroxides from lipids.

Water:

At least 8 glasses (250ml) or more of safe drinking water per day

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Side Effects related to TB drugs and food intake recommendations to minimize them

Drug name	Food recommendation	avoid	Possible side effects
Rifampicin	To be taken I hr before or 2 after food. I hr before antacids	alcohol	Nausea, vomiting, appetite loss
Isoniazid	Taken 1 hr before or 2 hrs after food. Give 10mg B_6 daily	Alcohol	Interferes with
Ethambutol	May be taken with food	Avoid alcohol	
Streptomycin	Increase fluid intake		Taste changes, taste of food, nausea
Pyrazinamide	May be taken with food		
Ethionamide	Take with or after meals (Supplement with Vit B_6)	Alcohol	Abdominal discomforts, nausea
Ofloxacin	Take 2hrs before or after food	Antacids, milk products	
Kanamycin	Can be taken without regard to food		
Capreomycin	Increase fluid intake, take with foods high in potassium(bananas, avocados)		

Para-aminosalicylic acid(PAS)	Take with or immediately after food. Increase fluid intake	Alcohol	
Cycloserine	Supplement with vitamin B_6	alcohol	

Infant and Young Child Feeding in the Context of HIV/AIDS

An infant is a child from birth to 12 months of age. There are two main options of feeding HIV exposed infants:

- o Breastfeeding
- o Alternative feeding

Breastfeeding is with appropriate use of anti-retroviral drugs for mother and baby is the best option for overall well-being and survival of HIV exposed children

All HIV positive pregnant women should be put on ART and the exposed child receives prophylaxis for 6 months

Once ARV is started, it is taken for life

Exclusive breastfeeding: Mother gives her infant only breastmilk, not even water, except for drops or syrups consisting of vitamins, mineral supplements, or medicines (when indicated).

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MTCT and Breastfeeding

- ARV treatment and prophylaxis can reduce MTCT of HIV by at least 50%.
- ARV prophylaxis does not provide long-term protection for breastfed infant.
- Without interventions (ARV prophylaxis or therapy) 5–15% of infants born to mothers infected with HIV can become HIV-infected during breastfeeding.
- Mothers living with HIV should breastfeed for at least 12 months or longer while being supported for ART adherence

Infant Feeding Options

1. Exclusive breastfeeding
2. Exclusive with early cessation
3. Wet nursing- baby is nursed and cared for by a different mother from the biological one.
4. Expressing and heat-treating
5. Replacement feeding

Guidelines for feeding infants & young children

1. HIV negative mothers should exclusively breastfeed for the first 6 months and continue

breastfeeding with appropriate complementary feeding after 6 months and continue breastfeeding for at least 24 months

2. HIV infected mothers to exclusively breastfeed for 6 months, introduce complementary feeding at 6 months and continue breastfeeding for 12 months.
    - Mother should be on retroviral treatment while the infant should be on prophylaxis
3. Reactive mums who choose not to breastfeeding should be guided to choose AFASS (Affordable, Feasible, Acceptable, Safe and Sustainable) food for exclusive replacement feeding (e.g. infant formula). The infant should be on prophylaxis for 6 weeks.
4. The counseling on exclusive replacement feeding should be in line with Breast Milk Substitute Regulation and Control (BMS) act.
5. If HIV infected mum should stop breastfeeding gradually and prophylaxis should continue for a week after stopping.
6. If mother and infant are HIV infected, exclusive breastfeeding shall be practiced with introduction of complementary feeding at 6 months but baby and mother should be put on ART.

Benefits of Breastfeeding

- Adequate nutrition
- Best source of food security for infant
- Brest milk provides nutritional needs for up to 6 months
- Provides enough water (contains aprox. 87%)-no additional water required
- Easily digested & its composition changes to meet developmental needs of the growing infant
- Contains enzymes which help complete digestion of fat
    - Breastfeeding is natural and most economic method of feeding the infant
- Protection against infections
    - Colostrum contains high levels of immunoglobulin, essential for immune system
    - Milk provides vital protection against deadly childhood infections e.g. diarrhea & respiratory infections
    - Breast milk protects the baby against viruses, bacteria and allergy

Benefits to the mother

- Promotes bonding between the mother and baby
- Exclusive breastfeeding has no demands on the mother
- May help prevent the mother from getting pregnant

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- Helps the uterus to contract after delivery and reduces postpartum bleeding
- Reduces the risk of breast, ovarian and other reproductive cancers

Benefits to the community

- Cost effective
- Lowers morbidity and infant mortality rate

- Whatever infant feeding choice a mother makes, she should be supported

Advantages and Disadvantages of Exclusive breastfeeding in the Context of HIV/AIDS

Advantages:

- Easily digestible
- Nutritious, complete
- Always available
- No special preparation needed
- Reduces mother's risk of breast cancer
- Increases birth spacing
- Protects from diarrhoea, pneumonia, other infections/diseases
- Compared to mixed feeding, lowers risk of HIV
- Promotes bonding

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Disadvantages:

- Risk of passing HIV to baby
- Increased risk if mother has breast infection
- Increases risk of death in immunosuppressed women
- Mother requires additional calories to support breastfeeding
- Requires feeding on demand.

Management of Early Cessation

- Express enough breastmilk to prevent engorgement and reduce discomfort.
- Encourage early practice of cup or cup and spoon feeding with expressed breast milk.
- Enlist family members to assist with feeding and comforting of the infant.
- Alternate warm/cold compresses to reduce breast discomfort and swelling.
- Provide assurance that challenges are time-limited.

Replacement Feeding

This refers to when a child who is not breastfed is provided with an alternative that provides all the nutrients that the child needs. This can be in the form of:

- Commercial infant formula
- Home-modified formula with micronutrient supplements

Important considerations to make include:

- Cost and sustained availability
- Reliable sources of animal milk products and multinutrient supplements
- Education in safe preparation and storage

Cup feeding is recommended over bottle feeding

Advantages of Replacement feeding

- No risk of transmitting HIV to the infant
- Contains most nutrients needed by infant
- Other family members can help feed the infant

Disadvantages of Replacement Feeding

- Expensive
- Contains no antibodies to protect infant
- Can increase risk of diarrhoea
- May not contain all the nutrient requirements for the infant
- Can be more difficult to digest
- Must be carefully prepared and stored

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Replacement feeding should be:

- A-Acceptable
- A-Affordable
- F-Feasible
- S-Sustainable
- S-Safe

- **Acceptable**
    - The mother perceives no barrier, cultural or social, to replace feeding and has no fear of stigma. She will be able to cope with pressure from family and friends to breastfeed.

- **Feasible**
    - The mother has adequate time, knowledge, skills and other resources to prepare the replacement food and feed the infant up to 12 times in 24 hours.
    - Need for reasonable home infrastructure and family support, especially for night feeds
    - Availability of electricity, electric kettle, bottle cleaning brush, flask to store boiled water etc

- **Affordable**
    - The mother and family can purchase formula, including all ingredients, fuel, clean water, soap and equipment, without compromising the health and
- **Sustainable**
    - Availability of a continuous and uninterrupted supply and dependable system of distribution of formula for as long as the infant needs it
    - If provided for free, will supply system be able to cope?
    - Will mother always be able to find it when needed
- **Safe**
    - Replacement foods are correctly and hygienically prepared and stored, and fed in nutritionally adequate quantities, with clean hands and clean utensils, preferably by cup
    - Is there a safe water supply?
    - Can water be hot each time?
    - Nutrition of the family and also possible increased medical costs

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Expressing and Heat Treating Breast milk

Mothers known to be living with HIV may consider expressing and heat-treating breast milk as an interim feeding strategy. Expressing breast milk is necessary in the following circumstances:

- In special circumstances, such as when the infant has low birth weight or is otherwise ill in the neonatal period and unable to breastfeed
- When the mother is unwell and temporarily unable to breastfeed or has a temporary breast health problem such as mastitis
- To assist mothers in stopping breastfeeding
- If ARV drugs are temporarily not available.

Nutrition Care for HIV Infected Children

The child's diet should contain sufficient amounts of fluids, calories, proteins, fats, carbohydrates, vitamins, minerals and salts to meet their daily nutritional requirements.

- Energy
    - Calorie requirements depend upon body size and surface area, rate of growth, physical activity, food habits & climate
    - In a balanced diet, 50% calories from CHO, 15% from proteins, and 35% from fats
    - For HIV infected children, the energy increase is 10% (asymptomatic), 20-30% (symptomatic with no weight loss), 100% (symptomatic with weight loss)
- Proteins
    - Essential for synthesis of body tissues in growth, and during maintenance and repair
    - Requirements are same as shown in the table (next slide).
- Carbohydrates
    - Main source of energy and supply bulk in the diet.
    - Requirements increase similar to the energy
- Micronutrients
    - Vitamins- organic substances and essential micronutrients for maintenance of normal health
    - Minerals – inorganic elements, required by human body for growth, repair and regulations of vital body functions
    - Micronutrient requirements are the same as those for uninfected child
- Nutrition assessment and growth monitoring should be done frequently
- Assess feeding practices and dietary intake with every contact
- If growth is faltering;
    - Carry out physical exam to rule out infections & health related problems e.g. poor appetite
    - Support the caregiver to ensure the child receives the adequate amount of energy, protein and micronutrients to meet increased demand.
- If the child is losing or has lost Lean Body Mass (LBM), it is possible he/she is having symptoms of AIDS and the following actions should be taken;
    - Provide oral nutritional supplementation
    - Refer the child for ARV assessment and recruitment to the treatment program, if they meet the national criteria.

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Management of HIV Infected Malnourished Child

- Nutrition care for HIV infected malnourished child is accomplished in 2 phases;
    - Stabilization phase – acute medical conditions are managed
    - Rehabilitation phase- to help catch up growth
- There are ten essential steps for management of severely malnourished children. They are:
    - Treat/Prevent hypoglycemia
    - Treat/Prevent hypothermia
    - Treat/Prevent dehydration
    - Correct electrolyte imbalance
    - Treat/Prevent infection
    - Correct micronutrient deficiencies
    - Start cautious feeding
    - Achieve catch-up growth
    - Provide sensory stimulation & emotional support
    - Prepare for follow up after recovery

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A nutritional action for a malnourished child includes;

- Stabilizing blood sugar levels
- Rehydration and correction of electrolyte imbalances
- Micronutrient supplementation
- Nutritional rehabilitation by nutritionist
- Provision of community based therapeutic support
- Advise to caregivers about the importance of seeking care immediately from a healthcare provider for a child with signs of malnutrition
- Advise caregivers on the importance of taking children for growth monitoring and seeking health care and support.
- Refer severely malnourished children with HIV/AIDS who are not on ARVs to providers of ART services
- HIV exposed or infected children with weight-for-height of less than -3 Z score should be managed for malnutrition for 7 days and supported with therapeutic food for not less than a month
- They should also receive vitamin A, presumptive deworming, and all vaccines as required.
- They should be given a suitable multi-micronutrient supplement daily at one RDA.

Nutrient-Drug Interaction in ART

- Antiretroviral drugs (ARVs) are drugs used to manage HIV by lowering the viral load and thus reducing morbidity and mortality.
- These drugs can influence the utilization of food and nutrients by the body. Likewise, food can affect the way the medicines work.
- Combination ARV therapy (cART) is referred to as highly active ART(HAART).
- HAART can reduce the amount of HIV in someone's body and restore their immune system

Food and drug interactions may be positive or negative but primarily fall into the following categories:

1. Drugs may alter nutrient absorption, metabolism, distribution and excretion thus affecting nutritional status of the patient.
2. Food may affect efficacy of medications due to altered absorption, metabolism, distribution and excretion.
3. Some drugs may lower food intake and/or absorption. For instance, most drugs have diet restrictions (e.g. avoiding milk and milk products when taking Tetracycline drugs).
4. Common OIs such as TB, malaria, diarrhoeal diseases, pneumonia, mucosa and skin infections, and the drugs used to treat them, may cause dietary constraints.
5. The interaction of food and drugs, along with the nutritional status of the patient, affects drug efficacy, tolerability and adherence to recommended drug regimens.

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ARV Related Complications

ARV can interact with food and nutrition in a variety of ways, resulting in both positive and negative outcomes.

It is thus critical to understand the specific ARV-nutrient interactions and implications to enable effective management of the resulting condition.

- Some food ingredients affect the efficacy of certain ARVs and other drugs by affecting their absorption, metabolism, distribution and excretion. As a result those foods can either enhance or reduce the efficacy of some ARVs.
- A high energy, high fat and high protein meal decreases absorption of the PI indinavir; while a high fat meal increases the bioavailability of the NRTI tenofovir.
- Certain protease inhibitors such as ritonavir and nelfinavir, can cause changes in metabolism of lipids (fats), resulting in an elevation of blood cholesterol and triglyceride levels leading to increased risk of coronary heart disease
- It has been established that vitamin A and riboflavin influence metabolic activities in the body. Riboflavin, in particular, has been linked with effectiveness of some *antineoplastic drugs* and drugs which are used to treat malaria.

- A high-fat meal increases the bioavailability of the Tenofovir, but the same lowers absorption of Amprenavir.

  High protein foods reduce absorption of Indinavir, but increase that of Nelfinavir.
- Grapefruit juice may inhibit intestinal enzymes that metabolize ARVs, especially protease inhibitors, resulting in poor bioavailability and slow cleansing of the drug from the body.
- Garlic may reduce the efficacy of Saquinavir.

15.3.6.3 Self-Assessment

1. Identify three ways in which HIV/AIDS can be transmitted
2. Outline the health and nutrition implications of HIV/AIDS
3. Explain five objectives of nutritional management of HIV/AIDS
4. Outline the advantages of breastfeeding in the context of HIV/AIDS
5. Indicate whether the following statements are TRUE or FALSE about HIV/AIDS management

   A. HIV can be transmitted from a mother to a child through breastfeeding

   B. People living with HIV/AIDS have an decreased Resting Energy Equilibrium (REE)

   C. Infection increases demand for and utilization of antioxidant vitamins and minerals

   D. Breastfeeding with appropriate use of anti-retroviral drugs for mother and baby is the best option for overall well-being and survival of HIV exposed children

   E. A high-fat meal decreases the bioavailability of the Tenofovir, but the same lowers absorption of Amprenavir.

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15.3.6.4 Tools, Equipment, Supplies and Materials

- Food exchange list
- Reference manual
- Drug diet interaction reference
- Calculator
- Stationery (Pen, Paper, referral notes, File)
- WHO guidelines
- MOH guidelines
- Ministry of Education

- Skills lab
    - Use of LCDs, video clips, charts and other teaching aids
    - Invitation of competent expertise
    - Computers with internet
- Library and resource centre

15.3.6.5 References

World Health Organization. (2004). Nutrient requirements for people living with HIV.

Anyang'Nyong'o, H. P. P., & EGH, M. Kenya National Clinical Nutrition And Dietetics Reference Manual First Edition.

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15.3.7 Learning Outcome 6: Demonstrate understanding in nutritional management of childhood disorders

15.3.7.1 Learning Activities

Learning Activities	Special instructions
1. Identify and describe childhood disorders as per resource materials, policies and guidelines	• Use terminologies related to childhood disorders • Consider the nutritional implications of childhood disorders • Plan a diet for childhood disorders Apply guidelines provided for childhood disorders

15.3.7.2 Information Sheet

1. Phenylketonuria (PKU)

- It is an autosomal recessive inherited disorder of amino acid metabolism that affects the body's utilization of protein.
- It is marked by the inability to process the amino acid phenylalanine, causing mental retardation & is caused by the absence of the enzyme phenylalanine hydroxylase
- Children with PKU have a deficiency of the liver enzyme phenylalanine hydroxylase that normally breaks down the essential amino acid phenylalanine into tyrosine.
- As a result, phenylalanine accumulates in the blood, causing a musty body and urine odor, irritability, vomiting, hyperactivity, seizures and eczema like rash.

Diet therapy in PKU

- Diet low in phenylalanine to keep plasma phenylalanine levels between 2 and 6 mg/dl
- The diet must meet the child's need for optimal growth
- High-protein foods (meats and dairy products) are avoided and aspartame are avoided because they contain large amounts of phenylalanine.
- Elemental foods (with phenylalanine removed) can be used.
- The low-phenylalanine diet should be maintained for life
- The low phenylalanine diet is especially good for adolescent females and women prior to conception and during pregnancy to prevent congenital anomalies (low birth weight, mental retardation, microcephaly) in the fetus.

2. Galactosemia

- It is a disorder of carbohydrate metabolism that has an autosomal recessive inheritance pattern
- It results from a deficiency of the liver enzyme galactose-1-phosphate uridyltransferase (GALT), one of the three enzymes needed to convert glucose into galactose.
- The lack of enzyme leads to accumulation of galactose metabolites in the eyes, liver, kidney, and brain, rapidly damaging the organs and causing lifethreatening problems.

Diet therapy in galactosemia

- Infants with galactosemia are placed on a lactose- or galactose-free formula e.g. soybean or meta-based formula
- A galactose-free diet (no milk or cheese products, including foods with dry milk products) is prescribed when the infant is ready to for solid foods.
- In spite of this diet, complications (learning disabilities, speech defects, ovarian failure, and neurologic syndromes) develop in many children)

3. Maple Syrup Urine Disease (MSUD)

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- It is a disorder of amino acid metabolism that has an autosomal recessive inheritance pattern.
- In MSUD, three essential amino acids (leucine, isoleucine, and valine) cannot be broken down because of absent or defective enzymes branched chain alpha-ketocid dehydrogenase. This results in in alpha ketoacidosis.
- All three amino acids are essential to form normal structure such as the hair, skin, and muscle.
- Leucine has the potential to accumulate in the brain and cause cerebral edema, progressive neurologic impairment, and death.
- Within 3 to 7 days of life, the new born develops symptoms of poor appetite, lethargy, vomiting, variable muscle tone, irritability, seizures, high pitched cry and a sweet smell.

Diet therapy in MSUD

- Foods rich in amino acids, calories, vitamins, minerals and other nutrients are prescribed.
- These special medical foods have the three amino acids removed.
- The child needs special low-protein foods that are adequate for growth with enough calories to support twice the child's basal metabolic rate.

4. ALLERGY

- It is a hypersensitivity response of the immune system to common substances such as food and pollen.
- Allergens are substances that are foreign to the body and can cause an allergic reaction.
- Allergies can occur to any individual at any time and can be overgrown as with time as well.
- A person has a greater risk of developing an allergic condition if there is a family history of allergy, especially in their parents or siblings, but the environment also plays a role.

Food allergy

- It is an extreme immune response to food protein
- To protect us from illness & disease our immune systems are continuously trying to lessen the damage presented by substances called antigens. Antigens are part of proteins that our bodies recognize as dangerous and take steps to neutralize.
- Antigens can be found almost anywhere there is protein in foods or microorganisms like bacteria.

  There are two types of food allergies;

  - Immediate
  - Delayed allergic reaction

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They are different from other adverse reactions to food like toxin-mediated reactions, pharmacological reactions and food intolerance.

The most common allergic component in food is protein. This occurs especially when protein is identified as harmful by body's immune system. Furthermore, some proteins or fragments of proteins are resistant to digestion and those that are not broken down by the digestive system are tagged by the immunoglobulinE (igE). The immune system is fooled by these tag foods to think that protein is the invader. On thinking that that the body is under attack, the immune system sends white blood cells to attack hence triggering an allergic reaction.

The resulting reaction can vary from mild to severe. The resulting allergic reactions are respiratory, gastrointestinal and dermatitis distress. Other reactions such as anaphylactic shock can be life threatening and they need immediate medical attention.

Anaphylactic shock is a life-threatening reaction, following exposure to a trigger. It is characterized by impaired breathing, a drastic drop in blood pressure and can be fatal.

Common food that cause allergic reactions include:

- o Shellfish
- o Eggs
- o Milk

- Soy
- Peanuts
- Fish
- Wheat

Signs and Symptoms of food allergies include:

- Vomiting
- Stomach upsets
- Hives
- Shortness of breath and wheezing
- Pale or blue coloring of skin
- Repetitive cough
- Shock
- Tight throat
- Trouble swallowing
- Swelling of the tongue which affects the ability to talk or breathe
- Weak pulse
- Dizziness

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Management of Food Allergies

- Foods that cause allergic reaction should be avoided
- Read food labels to know ingredients of packed foods
- Infants should be introduced to trigger-foods one at a time to take note of adverse reactions
- Consume a varied diet to complete dietary needs. In some extreme, supplementation may be necessary.

15.3.7.3 Self-Assessment

1. Discuss diet therapy in phenylketonuria
2. List the common foods that cause allergic reactions
3. List the signs and symptoms of food allergies
4. _____ is an autosomal recessive inherited disorder inability to process the amino acid phenylalanine.

   A. Galactosemia
   B. Lactose intolerance
   C. Phenylketonuria
   D. Marple Syrup Disease

5. The following amino acids cannot be tolerated by persons suffering from MSUD except:

   A. Leucine
   B. Phenylalanine
   C. Isoleucine
   D. Valine

6. Indicate whether the following statements are TRUE or FALSE

   A. Allergies only affect infants and young children
   B. A person has a greater risk of developing an allergic condition if there is a family history of allergy
   C. Allergies can be fatal
   D. Some allergies can be overgrown with time

15.3.7.4 Tools, Equipment, Supplies and Materials

- Food exchange list
- Reference manual
- Drug diet interaction reference
- Calculator
- Stationery (Pen, Paper, referral notes, File)
- WHO guidelines
- MOH guidelines
- Ministry of Education
- Skills lab
- Use of LCDs, video clips, charts and other teaching aids
- Invitation of competent expertise
- Computers with internet
- Library and resource centre

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15.3.7.5 References

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