


Nursing Guidelines:
HIV and Nutrition

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From the onset of infection, the HIV virus causes a number of changes in nutritional status. These can range from weight loss/gain, vitamin and mineral deficiencies, and metabolic complications. By using the following tools, a clinician can assess changes in a patient's nutritional health and make the proper recommendations to allow for the maximum benefit to the patient.

Anthropometrics

Anthropometry, the evaluation of height, weight and body cell mass, is an important part of a clinician's physical assessment and should be monitored routinely to measure for nutritional status alterations. Height should be measured annually. As patients age, bone density can change and cause a reduction in height which will alter calculations for ideal body weight and can be an indication of osteoporosis.

There are a number of ways to assess body weight. Upon initial examination, ideal body weight (IBW), a calculation based on the patient's gender and height, should be determined. IBW will be used in calculations to evaluate weight gain/loss.

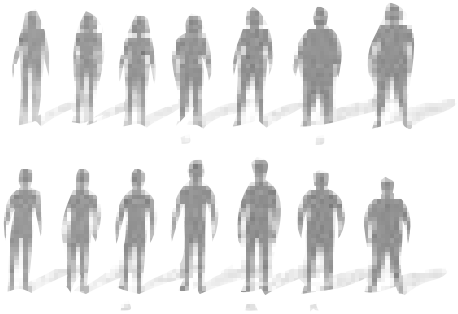
- **Male IBW = 106 pounds for first 60", 6 pounds for each additional inch**
- **Female IBW = 100 pounds for first 60", 5 pounds for each inch over or under 60"**

  i.e.: Male 72": 106 pounds + 6(12") = 178 pounds

Percent of IBW is commonly used for the approval of medications related to HIV wasting syndrome. To obtain the percent of IBW, divide the patient's current body weight (CBW) by the IBW.

A common method of weight assessment is the patient's body mass index (BMI), which evaluates weight for frame size. Since the calculation for BMI is fairly complicated, BMI tables have been created and can be found on a number of Internet websites (www.nutrition.gov). BMI is used to evaluate obesity and also as a trending tool.

BMI Standards



- **20-24.9: Normal**
- **25-29.9: Overweight**
- **30-34.9: Obese**
- **35+: Morbidly Obese**

Normal BMI values (20-25) are indicative of 95-120% of ideal body weight.
If the BMI is under 20, this could be an indication of malnutrition.

Watch for weight changes in your patients. HIV disease and multiple medications can affect the patient's nutrition status and a first indication of this is weight loss. As little as 3% to 5% of involuntary weight loss over a four-month period increases the risk of infection and a greater than 5% loss of weight is an indication of wasting syndrome. Percentage of weight change values are also used in the approval of many medications. In order to determine the percentage of weight change, use the following formula:

$$\frac{\textbf{Current body weight}}{\textbf{Usual body weight}} = \textbf{percentage weight change}$$

The waist-to-hip ratio is an indicator of body shape which can be statistically related to the risk of various health problems and diseases. To measure waist-to-hip ratio, use a measuring tape and measure the circumference of the patient's hips at the widest part of the buttocks. Measure the waist holding the measuring tape just above the belly button near the smaller circumference of the waist. Divide the waist measurement by the hip measurement. The waist-hip ratio should be below 0.95 in men and 0.8 in women as these levels indicate obesity and are associated with greater health risks like diabetes and heart disease.

Bioelectrical impedance analysis (BIA) works by sending an extremely weak (and harmless) electric current through the body. The body's total weight consists of fat, muscles, bones and water. Each of these conducts electricity in different ways.

By measuring the electric resistance of some of these masses in the body, and estimating other masses, the BIA test is able to accurately measure what percentage of the total body weight is made up from each.

It is important to obtain comprehensive diet history including meal patterns of at least 24 hours, current dietary intake (calories, protein, fluid and other key nutrients, and alcohol), access to food and preparation, tobacco use and physical activity pattern, food and water safety practices and psychological/economic and functional status issues impacting nutrition therapy.

Calorie Needs

Calorie needs specific to individuals with HIV are:

HIV Status	Asymptomatic	Symptomatic	With Infection
Male (kcal/lb)	15-16	16-19	>20
Female (kcal/lb)	11-13	14-16	>17

Key nutrients include carbohydrates, protein, fat, fluids and vitamins and minerals. Carbohydrates should act as the main source of a patient's calories, with 40-60% of daily caloric intake coming from this source. Carbohydrates act as "fuel" for the body and are the only nutrients that can pass over the blood-brain barrier to feed the brain. Carbs also help to maintain the body's fluid balance.

Fiber is found in complex carbohydrates and is important to overall nutritional health. Fiber is the part of plant foods that cannot be digested, and exists in two forms: soluble and insoluble. Soluble fiber is most helpful with lowering cholesterol. Examples of foods containing soluble fiber include oatmeal, barley, beans, bananas and applesauce. Insoluble fiber keeps patients "regular." Foods such as bran, whole grains, skin on fruit and most vegetables contain insoluble fiber.

It is important to note that excess simple carbohydrates can elevate blood sugar levels which can lead to conditions like diabetes and insulin resistance. Simple carbohydrates include soda, candy, cake, juice, refined grain products and alcohol.

Protein provides important building blocks for the body and is found in all animal products. Protein should account for 10-20% of daily caloric intake or 1 gram of protein per 1 kilogram of body weight. Good sources of protein include fish, red meat, poultry, pork and dairy. Protein can also be found in nuts, legumes and tofu. If visceral protein stores are low (albumin, transferrin, TIBC), increasing the protein intake to 1.5 gram per 1 kilogram of body weight may be necessary.

Fat is also a key nutrient because it is calorie dense and makes food taste good. Total dietary fat intake, however, should be less than 30% of total daily caloric intake. There are several different types of fats. Saturated fats are mostly found in animal products such as meat and whole milk. Examples of food containing saturated fatty acids include butter, lard, cream, cheese, ground beef, bacon, hot dogs, dark meat poultry or pork, gravy and coconut oil. Saturated fats are dangerous because they tend to raise levels of LDL-cholesterol ("bad" cholesterol) in the blood. Elevated levels of LDL-cholesterol are associated with heart disease. Because of this, saturated fats should compose less than 10% of total caloric intake.

Mono-unsaturated fats tend to lower levels of LDL-cholesterol in the blood. Mono-unsaturated fats are found mostly in plant and seafoods. Almonds, cashews, sesame seeds, olives/olive oil, avocados and canola oil are all common sources of mono-unsaturated fats.

Poly-unsaturated fats tend to lower levels of both HDL-cholesterol ("good" cholesterol) and LDL-cholesterol in the blood. Polyunsaturated fats are mostly found in plant and seafoods and include foods such as safflower oil, corn oil, salmon, sardines, tuna and walnuts.

Omega fatty acids help prevent clogging of the arteries. Omega fats are found in fatty fish, soy and flaxseed. Good sources of omega fatty acids include sardines, salmon, albacore tuna, herring and rainbow trout.

Trans-fats are poly-unsaturated fats that have been hydrogenated to help solidify them, but they act like saturated fats in the bloodstream. Trans-fats are found in many processed foods and spreads including margarine, shortening and bakery items.

Cholesterol can be made in the body from some fats, but is also found in certain animal products. Foods such as eggs, high-fat dairy and high-fat meat all contain cholesterol. If heart disease is present in the patient, the patient should eat less than 300mg per day of cholesterol.

Fluids are important to nutritional health because they help remove waste products and aid with digestion. Fluid intake should be one cup for every 15 pounds of body weight. If the patient suffers from frequent vomiting and/or diarrhea, fluid replacement is essential.

Vitamins and Minerals

Vitamins and minerals are key nutrients because they help build cells and permit cells to carry out their functions. Vitamins and minerals also help the body dispose of waste products. HIV-positive individuals often are deficient in vitamins and minerals even with a healthy diet.

If T-cells are greater than 200, a multi-vitamin and mineral supplement and B-complex are recommended daily. If T-cells are less than 200, a multi-vitamin and mineral supplement are recommended BID, and B-complex is recommended daily. Other vitamins and minerals have been shown to be beneficial, but the pill burden may overwhelm the patient. Refer any patients who inquire about additional vitamins to a dietitian.

Side-Effect Management

Poor Appetite

Some days a patient may not feel like eating. Many different things like fatigue, pain, depression, vomiting or diarrhea can cause poor appetite. It is essential that a patient eat enough calories even on days like this. When a patient does not feel like eating, encourage the patient to:

- Eat favorite comfort foods and do not worry about how "healthy" those foods are as long as the body can tolerate them.
- Eat small frequent meals 5-6 times/day (2-3 hours apart).
- Include friends and family and eat in a space that is pleasant.
- Keep on-the-go snacks that will not spoil like pretzels, nuts, fruit, and protein bars.
- Try light exercise such as walking to stir appetite.
- If the patient cannot eat solid food, try a protein shake or liquid nutritional supplement, instead of skipping a meal.
- Prepare a large batch of food and freeze servings in small containers so they can easily be reheated as needed.
- Listen to hunger cues. When appetite returns, make sure they eat before the feelings of hunger go away.
- Consider medications that can stimulate appetite.

Nausea & Vomiting

Nausea and vomiting can occur because of medical treatments, many medications (especially anti-HIV drugs) and infections. If a patient is new to HIV medications, help the patient understand that nausea and vomiting are common side-effects and will eventually go away.

To help patients manage their symptoms, encourage them to try the following when experiencing nausea and vomiting:

- Eat dry bland foods like toast, pretzels, cereal, rice or saltines.
- Eat small amounts of food every 2 to 3 hours. Aim for 5 to 6 small meals or snacks per day.
- Do not eat and drink at the same time. Eat food first, then drink cold/cool high calorie fluids (ginger ale, sports drink, sweet tea, fruit juice, high-protein nutritional supplement).
- Try herbal tea (peppermint or chamomile), ginger tea or ginger candy.
- Eat food cold or at room temperature.
- Avoid the kitchen when food is prepared.
- Sit up after eating for at least 60 to 90 minutes.
- Listen to your body and use trial and error with favorite foods for tolerance. Keep favorite foods in easy to find places so they are always within reach.
- Consider medications that can control your nausea.
- Avoid food with strong odors such as fish, steamed vegetables, kraut, etc.

Malabsorption

Malabsorption is usually caused by protozoal infections of the small intestine which diminish villus/surface cell absorptive capacity, digestive enzyme secretion, and ultimately, nutrient absorption. Other causes of malabsorption, especially when diarrhea is present, are medications, bacterial infections, hypoalbuminemia, neoplasms, inflammatory processes and idiopathic HIV enteropathy. The nutrients most commonly affected by HIV-related malabsorption are fat, fat-soluble vitamins, lactose and minerals.

Individuals with malabsorption should be encouraged to eat foods that are low in fat and lactose, and high in protein, calories, vitamins and minerals. The severity of fat malabsorption can be reduced by pancreatic enzyme replacements. Available prescription, enteric-coated formulations include a combination of lipase, protease, and amylase; and the typical dose is 1 to 3 capsules with meals and snacks. When non-enteric-coated pancreatic enzyme replacements are used, they need to be given in higher doses than enteric-coated formulations. Additionally, a gastric acid suppressing medication may be necessary since gastric acid can partially degrade non-enteric-coated products.

If malabsorption is persistent, fat-soluble vitamin supplements are recommended. To meet daily dairy requirements, lactose-intolerant individuals should be counseled to eat yogurt and lactose-free or lactose-reduced products. Oral supplements, which are now available as nutrient-dense bars, soups, juices, and coffees, can be used to augment protein and calorie intake. A daily multivitamin/mineral supplement is generally recommended, while high dose vitamin and mineral supplements should be discouraged as they may intensify malabsorption or cause toxicities.

Diarrhea

Diarrhea may be a cause of malabsorption or may be due to infections or medication side-effects. Alcoholic, carbonated, and caffeinated beverages should be reduced because they stimulate gut motility and fluid secretions, exacerbating diarrhea. Fluid and electrolytes lost in diarrhea can be replaced by drinking at least 8 glasses of water, sports drinks or juices each day; eating bananas, fish or potatoes; and adding salt to foods. Foods that help to control diarrhea include bananas, rice, applesauce, tea, toast, and gummy bears. To prevent or reduce the risk of food or water-borne infections as a cause of diarrhea, advise patients about safe food handling, storage and preparation, as well as strategies for eating safely in restaurants and while traveling abroad. Calcium supplements at 500mg twice daily may help with medication related diarrhea. Providers may need to consider medication to help persistent diarrhea related to medications and/or no underlying presence of infection.

Anemia

Risk factors associated with anemia in HIV infection include female gender, African-American race, zidovudine treatment, low CD4 cell counts (<200 cells/uL), high HIV-RNA viral loads, chronic illness and blood loss. Anemia may also be due to nutritional deficits; caused either by inadequate ingestion or conditions that affect absorption or requirements. Microcytic anemia is most often due to iron deficiency; and macrocytic anemia is generally caused by decreased erythropoiesis secondary to either folate or vitamin B12 deficiency.

Individuals with microcytic anemia should be counseled to take daily oral iron supplements and to eat iron-rich foods, such as meat, fish, poultry, beans, dried fruits and fortified grains, cereals and energy bars. Iron absorption can be maximized by including sources of vitamin C (orange juice, cantaloupe slices) at every meal and by avoiding tea, coffee, or milk with meals or supplements.

For persons with macrocytic anemia, recommendations include oral folate supplements, IM or SQ injections of vitamin B12, and a diet high in protein (1.5 g/kg of body weight), fruits, and vegetables. Meats, eggs, milk and milk products are rich in vitamin B12, and fresh, uncooked fruits and vegetables, as well as their juices, are good sources of folate because folate is easily destroyed by heat.

Herbal/botanical supplements and alternative diets that exclude entire food groups should be used cautiously as these therapies may cause toxicities or deficiencies by altering nutrient intake, digestion, absorption, and utilization or by causing blood loss.

Lipodystrophy/Lipoatrophy

Since the early era of HAART, a variety of body shape changes have occurred in individuals receiving these therapies. In general, individuals can develop a loss of fat, known as lipoatrophy, in the face, arms, legs and/or buttocks. Fat accumulation can develop in the intra-abdominal area, upper back (buffalo hump), and/or breasts. Although no standard definition exists, these various body shape changes are commonly known as HIV-associated lipodystrophy. Both fat accumulation and lipoatropy can be associated with insulin resistance. Individuals with lipodystrophy may experience one or more of these body shape changes. In some instances, all of the body shape changes are present in one individual.

Nutrition and exercise interventions have provided improvement in some patients with HIV-associated lipodystrophy. Since the lipodystrophy syndrome has been associated with insulin resistance, nutrition recommendations for individuals with lipodystrophy are generally the same as the recommendations for those with insulin resistance (see section II-J: Insulin Resistance/Diabetes for more information on this topic).

Wasting Syndrome

Wasting syndrome is the unbalanced loss of lean muscle tissue over fat tissue. In comparison, when people experience starvation there is usually an equal loss of both muscle and fat. A person living with HIV/AIDS may experience both starvation and wasting. The Centers for Disease Control (CDC) define a HIV-positive person with wasting as being unintentionally 10% below normal body weight.

There are four major inter-related factors that contribute to wasting and involuntary weight loss:

1. Poor Appetite or not enough nutrition intake (See Poor Appetite section for management tips).

2. Malabsorption and/or Diarrhea (See Malabsorption and Diarrhea sections for management tips).

3. Altered metabolism occurs when lean muscle is used improperly as a source of energy and fat is unable to be broken down as an appropriate source of energy. HIV medications can increase metabolism even if the medications are bringing viral load to low levels. Anabolic therapies and/or nutritional supplements can help to build muscle.

4. The presence of low testosterone levels is known as hypogonadism and can occur in 30-50% of men living with HIV/AIDS. It is important to check testosterone levels in order to determine whether a patient has hypogonadism.

Classic wasting (before effective HIV medications were available) continues today for many reasons because some people do not have access to HIV medications, some people cannot tolerate HIV medications and some people choose not to take HIV medications. Unintentional weight loss of greater than 5 percent of total body weight can lead to a patient's getting sicker faster, can increase opportunistic infections and can decrease survival. Encourage patients to monitor their weight and seek help if they experience an

Hyperlipidemia

Dyslipidemias are common in HIV-infected individuals who are on HAART, particularly if the HAART regimen contains a protease inhibitor. Significant increases in serum triglycerides and total and low-density lipoprotein cholesterol (LDL-C) are associated with antiretroviral therapy and can lead to an increased risk in cardiovascular disease. Patients should be evaluated for risk factors for cardiovascular disease (family history, smoking, obesity, hypertension, sedentary lifestyle and diabetes). Lifestyle changes should be made where possible. Nutrition and exercise interventions should be the first approach for the management of hyperlipidemia.

Nutrition Intervention

The recommended nutrition plan for the management of hyperlipidemia is the National Cholesterol Education Program (NCEP) Therapeutic Lifestyle Changes (TLC) diet (Table 1).

Table 1. Therapeutic Lifestyle Changes (TLC) Diet

Nutrient	Recommendation
Total calories	Balance to maintain healthy body weight
Total fat	25% - 35% of total calories
Saturated fat	<7% of total calories
Polyunsaturated fat	Up to 10% of total calories
Monounsaturated fat	Up to 20% of total calories
Cholesterol	<200 mg/day
Carbohydrates	50% - 60% of total calories, mainly complex carbohydrates
Protein	~15% of total calories

More details of the TLC diet can be found at the National Heart Lung Blood Institute website: http://nhlbisupport.com/chd1/S2Tipsheets/foodgroup.htm.

In addition to following the TLC diet, individuals with severe hypertriglyceridemia should be advised to avoid simple sugars (sugar, honey, sodas, candy, cookies, pies, cakes and similar sweets) and alcohol. Fish oil supplements have shown some promise in reducing serum triglyceride levels. In general, 2-3 grams of fish oil have been shown to decrease triglyceride levels, but caution should be used since fish oil supplements can thin the blood and cause excess bleeding. Pharmacologic therapy is typically added when nutrition and exercise interventions alone do not decrease the elevated serum lipids.

Osteopenia/ Osteoporosis

The bone problems osteopenia and osteoporosis seem to be more common in HIV-infected individuals who are on HAART compared to those who are not on HAART. Osteopenia is a condition of diminished bone tissue or decreased bone density. Osteoporosis is a reduction in bone mass significant enough to causes an increase risk of bone fractures.

The diagnoses of osteopenia or osteoporosis are based on measurements of bone mineral density usually through dual x-ray absorptiometry (DXA). Gradual bone loss occurs with aging. In addition to aging, risk factors for osteoporosis include female gender (especially after menopause), white race, low body weight, smoking, excessive alcohol use, corticosteroid use, hypogonadism, hyperthyroidism, immobility and malabsorption.

Nutritionally, calcium and vitamin D intake should be optimized to help prevent these issues. For calcium, the recommended intake for adults is 1500mg per day. Dairy sources of calcium include milk, yogurt, cheese, cottage cheese, pudding, frozen yogurt and ice cream. Non-dairy source of calcium include dark green leafy vegetables, legumes, tofu made with calcium, and calcium-fortified beverages such as calcium-fortified orange juice and calcium-fortified soy beverages.

The recommended intake for vitamin D is 400 to 1000 IU per day. The major source of vitamin D is exposure to sunlight. Inadequate exposure, sunscreen and dark skin pigmentation limit absorption of vitamin D. Dietary sources of vitamin D include salmon, mackerel, herring, sardines and tuna, as well as vitamin D fortified milk and soy beverages.

Non-nutritional interventions for these bone problems include lifestyle changes such as smoking cessation, weight bearing exercises and reduction of alcohol intake. Pharmacologic interventions include treatment of hormone deficiencies and specific drugs

Insulin Resistance/Diabetes

Individuals receiving potent HAART regimens have a greater incidence of insulin resistance. Although the etiology of insulin resistance in HIV infected individuals is not clear, it is likely that drug toxicity, immune reconstitution and genetic factors all play a role.

Patients need to be assessed for risk factors for insulin resistance and diabetes mellitus, as well as for heart disease (family history, smoking, obesity, sedentary lifestyle and dyslipidemia). To monitor for insulin resistance, test blood sugar levels regularly, monitor triglyceride levels and obtain HgbA1c values if fasting glucose levels are consistantly elevated. Lifestyle changes should be made where possible. Nutrition and exercise recommendations for HIV infected individuals with insulin resistance or diabetes mellitus are the same as those for individuals without HIV disease. Calorie recommendations are based on achieving and maintaining healthy body weight. The diet should be composed of 50% to 60% carbohydrates (mostly complex carbohydrates such as whole grain breads and cereals and starchy vegetables). Simple carbohydrates should be limited (sugar, honey, candy, cookies, pies, cakes and similar sweets). Fresh fruits are favored over canned fruits and fruit juice. Beverages should be calorie-free such as bottled water, sugar-free sodas, and unsweetened tea or coffee. Artificial sweeteners can be used if desired. Protein such as lean meats and low-fat/fat-free meat alternatives (tofu, tempeh) should provide 10% to 20% of total calories.

Total fat intake should be limited to 30% of total calories. Healthy fats such as liquid vegetable oils, nuts and avocados are recommended. A fiber intake of at least 20-35 grams per day from a variety of sources is helpful in controlling blood sugar. This amount is usually achieved with adequate consumption of whole grains, fresh fruits and vegetables each day.

Detailed information on food groups and portion sizes can be located at the
American Diabetes Association website:
http://www.diabetes.org/nutrition-and-recipes/nutrition/foodpyramid.jsp
Pharmacologic therapy is generally necessary for HIV infected individuals with type 2 diabetes mellitus to reduce the hyperglycemia and improve insulin sensitivity.

Notes

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The Association of Nurses in AIDS Care (ANAC) was founded in 1987 to address the specific needs of nurses working in HIV/AIDS. ANAC's mission is to promote the individual and collective professional development of nurses involved in the delivery of healthcare to persons infected or affected by HIV, as well as the health and welfare of all infected persons.

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