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Nutrition Education Modules for Nurses

Geok Simm Tan

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Creative Component
In partial fulfilment for
Master of Family and Consumer Sciences, Dietetics
Iowa State University

Nutrition Education Modules for Nurses in Michigan
Medicine Adult Emergency Services

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Background

Balanced nutrition and diet are essential to promote health, prevent disease, and manage acute and chronic diseases (1, 2). A poor diet and lifestyle increase the mortality risk of non-communicable diseases, such as cardiovascular diseases, stroke, type 2 diabetes, and various types of cancers (3). Dietary management is important for hospitalized patients to prevent and treat malnutrition, reduce length of stay and hospital readmission, as well as decrease infection and complication rates (2, 4). In a health care setting, registered dietitians and nutritionists are responsible for maintaining patients' optimal nutrition by identifying nutritional issues, assessing nutritional status, developing meal plans, and providing counseling on special diet modifications (3). However, dietitians and nutritionists are not always available to the current structure of the healthcare industry (3, 5). In addition, patients may be less motivated to follow nutritional advice and their ability to learn may be affected by pain, anxiety or medication (5). Hence, nurses often assume the role of a nutrition assistant or a nutrition educator because they are the primary interface between the patient and the healthcare system (2). Nurses frequently initiate the nutrition screening processes, facilitate meal plan adjustments, and implement dietary modifications for patients with their families or caregivers (1, 3-6).

The nurse's role in nutrition support is not new and has been documented internationally (3). For example, in the United States, nutrition is the second most important area in nursing care (1, 3). Individuals who take the National Council Licensure Examination for Registered Nurses are asked several nutrition questions which include the following topics; nutritional assessment and monitoring, diet therapy, and enteral and parenteral nutrition (1, 3). In Australia, nurses ensure that their patient's nutritional intake is well monitored and documented. In the United Kingdom, nurses promote healthier lifestyle choices for their patients from admission through discharge (3). According to the 2006 UK National Institute for Health and Clinical Excellence Guidelines on nutrition support of adults, nurses are expected to be equipped with the appropriate knowledge to detect those who are at risk of malnutrition and provide dietary advice to improve their nutrition needs (6).

Nurses are expected to have basic nutrition knowledge and be able to explain the facts about healthy food choices to their patients (2, 3). However, many of them are lacking basic

nutrition knowledge regarding food sources of nutrients, dietary goals, and food safety (2-3, 5-6). A study conducted in the Kenyatta National Hospital has found that nurses are also lacking clinical nutrition knowledge in energy content and metabolic requirements, methods of feeding, and choices for nutrient administration (6). Other studies have also indicated that nurses do not receive adequate nutrition education in undergraduate and graduate nursing schools (1-3). For a nurse to become more versatile in nutrition, they should be recommended to take additional training classes under the nutrition basics and futuristic nutritional ideologies umbrellas. With these additional concepts, nurses will be able to better meet patients' nutritional needs while also ensuring that they can provide accurate nutrition information to their patients (3, 5).

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Introduction

Patient Food and Nutrition Services (PFANS) within Michigan Medicine is responsible for providing meals to patients in Adult Emergency Services (AES) 24 hours a day, 7 days a week. The Express Menu (Appendix A) is offered to patients in the AES. This menu has less selections when compare to the in-patient menus because patients in the AES have a shorter length of stay. However, this menu consists of the most popular items ordered by both in- and outpatients. These food items are designed to be compliant across many nutrition restricted diets including the following; consistent carbohydrate, cardiac, low sodium 2 gram, and renal diet. All food items available on the patient's menu are coded for compliancy in CBORD software system. CBORD is the software program used for the management of food procurement, production and nutrition services, which include hospital room services, enhanced bedside services, and automated tray ticket management.

Nurses in the AES are responsible for assisting patients with their meal selection. They review the menu selections and pass this information to the unit clerk. The unit clerk then enters and submits the meal order via an online order form which was developed by PFANS. At the receiving end, the PFANS call center obtains patient meal orders via email. Call center staff then utilize the CBORD system to process patients' tray tickets. Patients in the AES who are on a restricted diet frequently order non-compliant food items. For example, orange juice ordered for a renal diet patient, lettuce ordered for a dysphagia diet patient, mac and cheese, cheesecake and ice cream ordered for a cardiac diet patient (all on the same meal request). When patients order non-compliant meal items, the call center staff calls the unit clerk to ask for a substitution of the non-compliant food item. Then the unit clerk passes the message to the nurse, the nurse then talks to the patient and gets the new selection to the unit clerk. After that the unit clerk calls the PFANS call center and informs them of the substitution. Sometimes it could take up to 30 minutes to straighten out an order which will cause delays in patient care. Hence, the purpose of this project is to provide a basic understanding of nutrition and special diets while providing quick reference materials that define the appropriate foods for each restricted diet for the nurses in the AES. The goal of this educational program is to enhance patient care, reduce the order of non-compliant food items, and minimize the delay in obtaining a meal tray.

Methods

Five nutrition modules will be developed for nurses who work in the AES. These modules will be 1) basic nutrition (macro and micronutrients), 2) consistent carbohydrate diet, 3) cardiac and low sodium diet, 4) renal diet, and 5) dysphagia diet. The content for the educational materials will be obtained from the following resources; “Nutrition and Diet Therapy”, Carroll A. Lutz, Erin Mazur, and Nancy Litch, the 2015-2020 Dietary Guidelines for Americans, information from websites (e.g. Centers for Disease Control and Prevention, American Heart Association, National Kidney Foundation, National Institute of Diabetes and Digestive and Kidney Diseases, and Michigan Medicine patient education clearinghouse), in addition to published peer-reviewed journal articles and other reliable sources.

Microsoft Power Point presentation slides with voice recording will be developed for each module. In addition, a short interactive activity to help identify allowed food items for the restricted diets will be incorporated into each presentation. At the end of the presentation, a quiz with ten to fifteen multiple-choice questions will be provided to assess the learner’s competency on the module. Students must score at least an 80% to pass the module. The entire presentation with the quiz will be uploaded to Saba, the employee learning software that is used in Michigan Medicine. AES management can then assign and register their staff to complete the modules in Saba. The students will receive an email notification when they are registered to a module. Once the student completes a module, the date of completion and score of the quizzes will be recorded in the student’s learning plan. AES management can also obtain a report from Saba at any time to determine if their staff have completed the assigned modules. The modules are suggested to be incorporated into orientation and training for new nurses in the AES. Lastly, an ordering guide for complex diets such as renal and cardiac will be created based on the Express menu. These guides will allow the AES staff to quickly pick a substitution if their patient orders a non-compliant meal item.

Module 1 - Basic Nutrition: Nutrients

The learning objectives of this module are to:

- define the three types of macronutrients
- describe the general function and purpose of these macronutrients within the body
- identify common food sources of each macronutrient
- recognize common micronutrients

Nutrients are the chemical substances in food that the body requires for growth, maintenance and repair. Nutrients are important to provide energy or heat, support tissue growth and repair, and regulate basic chemical processes in the body. Essential nutrients are defined as the nutrients that are obtained from external sources such as food because the human body cannot produce them adequately. The six important classes of nutrients are carbohydrates, fats, proteins, minerals, vitamins and water. Carbohydrates, fats, and proteins are also called macronutrients whereas minerals and vitamins are called micronutrients. Macronutrients provide fuel or calories for the body and have specific functions. Daily requirements for each macronutrient will vary depending on age, activity level and health goals.

Carbohydrates

Carbohydrates are the major sources of energy in the body because they breakdown quicker than proteins and fats. The units of energy that power the body are called calories. Carbohydrates provide the body with 4 calories (kcal) per gram. Carbohydrates are divided into two major groups: sugars and starches. Sugars have a simple structure and they are often called simple carbohydrates. Starches are more complex, and they are often called complex carbohydrates. Monosaccharides and disaccharides are the two types of simple carbohydrates. Monosaccharides contain one molecule of carbohydrate and the three important monosaccharides are glucose, fructose and galactose. Glucose is the major form of sugar in the blood and thus it is commonly called blood sugar. Fructose is the sweetest of all monosaccharides and is commonly found in fruits and honey.

Disaccharides are comprised of two monosaccharides associated with a chemical bond. The three important disaccharides in foods are sucrose, lactose and maltose. Sucrose is glucose

+ fructose; lactose is glucose + galactose; and maltose is glucose + glucose. Sucrose is found in all types of sugar (brown, granulated and powdered sugar), molasses, maple syrup, fruits and vegetables. Table sugar (sucrose) and high fructose corn syrup (HFCS) are similar in their composition of glucose and fructose, and both are used to flavor and sweeten foods. Other forms of caloric sweeteners include brown sugar, molasses, maple syrup, corn syrup, agave syrup, and dextrose. These types of sugars are referred to as 'added sugar' when they are used in food preparation. Lactose is naturally found in dairy foods and is often referred to as milk sugar. Lactose is the least sweet of the disaccharides. Maltose is a byproduct of starch digestion. A small amount of maltose is found in malt, malt products, beer, some infant formulas and sprouting seeds. After digestion and absorption, the body converts fructose, galactose and other monosaccharides to glucose for further metabolism.

Complex carbohydrates or polysaccharides contain a variety of monosaccharides and disaccharides. The three important complex carbohydrates are starch, glycogen and fiber. Starch is the major source of digestible carbohydrate in the diet. Starch is comprised of glucose molecules bond together in straight and branched, tree-like chains. It is found in grains, starchy vegetables and legumes. Glycogen, also comprised of glucose chains and branches, is the storage form of glucose in liver and muscle tissue. Muscle glycogen provides immediate fuel in the form of glucose for muscle contraction. Liver glycogen sustains blood glucose levels during fasted periods. Dietary fiber refers to the poorly digested carbohydrates in foods. Fiber is classified based on its solubility in water. Soluble fiber forms gels and absorbs water during digestion, whereas insoluble fiber does not. Soluble fibers are found in beans, oatmeal, barley, broccoli, citrus fruits, and oat bran. The health benefits of soluble fibers include reducing cholesterol level, regulating blood sugar levels and assisting in weight loss. Insoluble fibers are found in fruit and vegetable skins, and the bran of wheat kernels. The health benefits of insoluble fibers include reducing bowel transit time and decreasing the risk of diverticular disease. Both forms of dietary fiber are beneficial for overall bowel health and reducing the risk of colorectal cancer.

Carbohydrates have an important role in the body as well. Not only do they provide energy to the body, they also spare body protein, help to prevent ketosis and enhance the learning and memory process. The body requires a continuous supply of glucose for all cells to

function. When dietary carbohydrates are insufficient and glycogen reserves are depleted, the body will metabolize protein and fat into glucose or ketones which can be utilized for energy. When this imbalance in nutrient intake is severe, muscle loss and internal organ damage can occur. The Recommended Dietary Allowance (RDA) of carbohydrates for both adults and children is 130 grams per day to maintain minimum glucose utilization in the brain because the brain is the organ that depends solely on carbohydrates for fuel. The RDA for carbohydrates for pregnant and lactating women is 175 grams and 210 grams, respectively. In the United States, men and women consume roughly 220 to 330 grams and 180 to 230 grams of carbohydrate per day, respectively. The Acceptable Macronutrient Distribution Ranges (AMDR) for carbohydrate intake is 45% to 65% of the total calories (2). In addition, the 2015-2020 Dietary Guidelines for Americans recommend people to limit their added sugar to 10% or less of total calories (3).

Proteins

Proteins are the major structural component of all body cells. It provides structure for skin, hair, muscles, ligaments, and tendons. More than half of the solid content of total cell volume is protein and skeletal muscle represents about 40% of total body protein. Adequate protein intake is essential to maintain cellular integrity, function, and reproduction. Many hormones and enzymes which regulate body processes are proteins. For example, insulin and glucagon regulate glucose metabolism, and growth hormone regulates protein synthesis and cell division. Enzymes including lipase, peptidase, and sucrase that breakdown fats, proteins and sugars, respectively are also proteins. Antibodies, or immune system proteins, protect against foreign materials that enter the body. Albumin is the main protein in blood that maintains blood volume and pressure. Protein is unique among the macronutrients in that it contains nitrogen. For this reason, protein intake must be carefully balanced in patients with limited renal function or other conditions that can cause nitrogen accumulation. Proteins can be adapted as backup energy sources especially when the glucose is insufficient to meet the body energy needs. Proteins provide the body with 4 kcal per gram, which is the same as the carbohydrate.

Amino acid are the building blocks of proteins. There are 22 distinct amino acids in human biology, which can either be synthesized internally (non-essential) or must be provided by the

diet (essential). The nine essential amino acids for humans are histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine. Complete proteins refer to foods that provide all nine essential amino acids in the correct ratio to maintain tissue and support growth. Complete proteins are 90 to 99% digestible based on the absorption of amino acids and are mainly from animal sources such as meat, fish, poultry, eggs, and dairy. For instance, each serving of meat or meat substitutes provides 7 grams of protein while each serving of milk provides 8 grams of protein (Table 1).

A Serving	Grams of Protein	Examples
Milk (fat free, reduced fat or whole milk)	8	1 cup of 1% milk 1 cup of 2% milk ½ cup of evaporated whole milk
Meat and Meat Substitutes (lean, medium-fat, high-fat, or plant-based proteins)	7	1-ounce Canadian bacon 1 egg 1-ounce cheddar cheese ½ cooked kidney beans
Starch	2.7 3.0 1.2 2.0 4.1	1 slice of whole wheat bread ½ cup cooked oatmeal ½ cooked barley ½ cup mashed potato with milk ½ cup green peas
Non-starchy Vegetable	2.1 2.8	½ cup cooked broccoli ½ cup cooked Brussel sprouts

Table 1 Grams of protein per serving (1)

Most plants are considered incomplete proteins, meaning that they lack one or more essential amino acid. An individual can obtain all essential amino acids from combining different types of plant food. Incomplete proteins from grains, vegetables, legumes, nuts and seeds are 70% to 90% digestible. Soybeans and quinoa are two exceptions of complete proteins from plants. One serving of vegetable provides 2 grams of protein whereas one serving of starch provides 1 to 4 grams of protein (Table 1). Legumes are an important protein source for vegetarians or vegans who do not consume animal products. The roots of legume's plant contain nitrogen-fixing bacteria that help to increase nitrogen content in legumes. Peas, beans, lentils, and peanuts are the common legumes that are consumed. However, not all foods named peas and beans are

legumes. For example, one cup of green beans contains less than 5 grams of protein while one cup of kidney beans provides more than 15 grams of protein. Figure 1 illustrated the comparison of protein content in plant food.

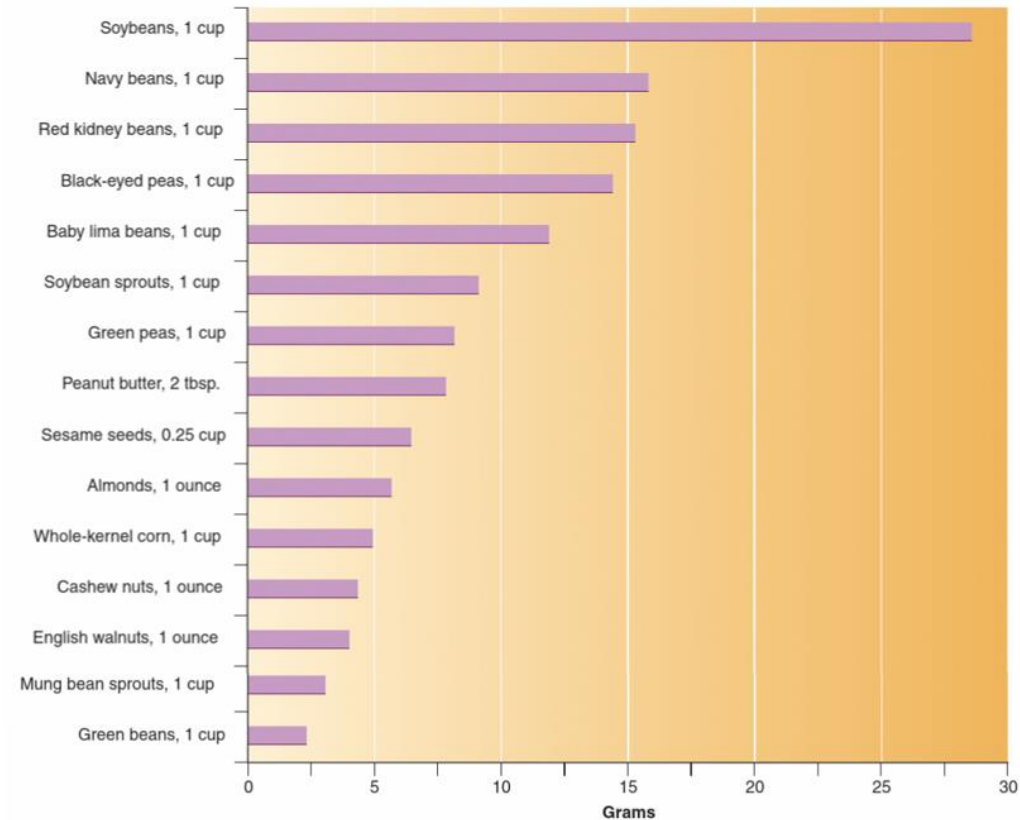


Figure 1 Protein content in plant food (1)

The AMDR for protein intake is 10% to 35% of the total calories (2). The 2015-2020 Dietary Guidelines for Americans recommends 5 ½ ounce-equivalents of protein foods per day and at least 8 ounce-equivalents of seafood per week for a 2,000-calorie diet (3). It is recommended that the dietary protein should be obtained from different sources such as seafood, meats, poultry, eggs, dairy, nuts, seeds and soy products. The RDA for both men and women is 0.8 grams of high-quality protein per kilogram of body weight per day. However, a more common problem in the United States is excess intake of protein. Excess protein that the body does not need is stored as fat in adipose tissues and will increase the demand on the kidney to excrete the unused nitrogen.

Lipids

Lipids, or fats, have several major functions in the body. Lipids provide energy for tissues and function as an energy reserve. Lipids provide the body with 9 kcal per gram. Lipids are stored in adipocytes within adipose tissues, which provide a ready reserve to meet energy needs. The adipose tissue plays an important role in the body cushion vital organs such as eyes and kidneys by absorbing mechanical shocks to protect them from damage, and to insulate the body from excessive heat or cold. Lipids have functional roles as well, for example they help transmit nerve impulses, are essential components of the lipid membrane surrounding all cells and are the precursor for many regulatory molecules. Lipids lubricate body tissues by excreting sebaceous glands and lubricating the skin to prevent water loss in the body to the outside environment. Within the body, lipids are transported via a well-regulated system that included chylomicrons from the intestine and lipoproteins produced in the liver. The fat-soluble vitamins A, D, E, and K are distributed and absorbed via this system, as well.

Diets that contain high amounts of fat have been associated with an increased risk of cardiovascular disease and certain cancers, obesity and diabetes development. This is in part due to the higher caloric value of fats (9 kcal/g versus 4 kcal/g for carbohydrates or proteins) but may also be associated with the specific metabolism of some types of fatty acids. Fatty acids can be classified in a few ways. Most commonly, they are defined by the presence and number of double bonds in the carbon chain. Fats that have no double bonds are referred to as saturated fats, whereas fats with 2 or more double bonds are called unsaturated fats. The degree of hydrogen saturation affects the physical characteristics of the fats. Saturated fats are solid at the room temperature and are found in animal products such as meat, poultry, whole milk and butter as well as some plants such as tropical coconut and palm-kernel oils and cocoa butter. Saturated fats are more chemically stable than unsaturated fats. Thus, the products that are high in saturated fats tend to have longer shelf life. However, saturated fat is associated with an increased risk for cardiovascular disease. The 2015-2020 Dietary Guidelines for Americans recommends people to consume less than 10% of calories from saturated fats (3).

Unsaturated fats are liquid at the room temperature and normally found in plants. Monounsaturated fats (those with one carbon double bond) are found in nuts, avocados, olives,

canola and peanut oils. Research has shown that monounsaturated fats improve blood cholesterol levels and reduce the risk for cardiovascular disease. Within the family of polyunsaturated fats (those with 2 or more carbon double bonds), the omega nomenclature is used. This is based on the placement of the first double bond from the omega end of the fatty acid. Each fatty acid has an omega end and alpha end. The omega end is the methyl group side of the fatty acid chain, and the alpha end is the carboxyl group side. Because of the capacity of human metabolism of fatty acids, the location of the first double bond from the methyl end remains constant as carbons are added to or removed from the chain. Hence, polyunsaturated fats are classified as being omega-3 or omega-6, meaning the first double bond is 3 carbons from the methyl end or 6 carbons from the methyl end, respectively.

Omega-3 fatty acids are found in walnuts, fatty fish such as salmon, sardines, mackerel, tuna, and some oils such as soybean, canola, flaxseed and fish. The most common fatty acids in the omega-3 family are eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Omega-6 fatty acids are commonly found in nuts and vegetable oils such as safflowers, sunflowers, corn, soybeans, and cottonseeds. The most common fatty acids in the omega-6 family are linoleic acid and arachidonic acid. The body uses both omega-3 and omega-6 fatty acids to produce a wide range of molecules, including prostaglandins and eicosanoids which mediate blood pressure and inflammation. In general, the omega-3 family produces prostaglandins that are more beneficial for cardiovascular health than those produced from omega-6 fatty acids. Figure 2 illustrates the comparison chart of the types of dietary fats in common foods. The AMDR for fat intake is 20% to 35% of the total calories (2). The 2015-2020 Dietary Guidelines for Americans recommends 27 grams of oils per day for a 2,000 calories diet (3).

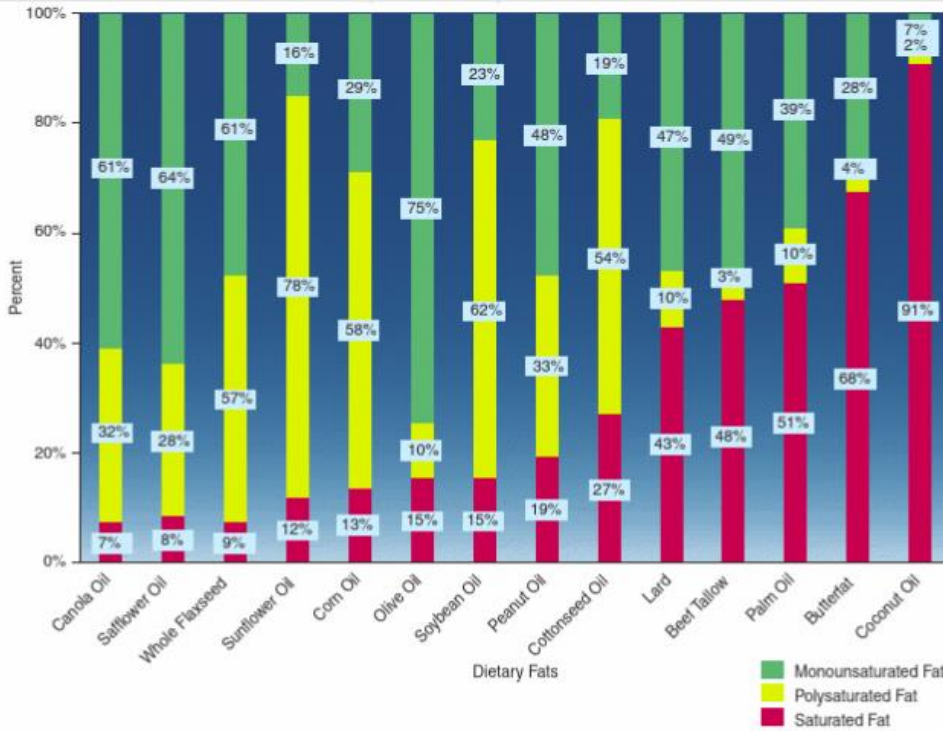


Figure 2 Comparison of dietary fats (1)

Another characteristic of unsaturated fatty acids is the orientation of the carbon chain surrounding the double carbon bond. When the two sides of the carbon chain on either side of the bond are in the same spatial plane, the fatty acid is called 'cis' which means same. Cis-fatty acids are the natural form of unsaturated fats found in foods and in the body. In order to increase the hardness of unsaturated fatty acids, a process called hydrogenation has been used. This process adds hydrogens to the carbon double bonds, thereby increasing the degree of saturation. Partially hydrogenated oils (PHO) have been used in foods since the 1950s when this process was developed. PHO have value in foods because they add texture and structure and are more resistant to oxidative damage than unsaturated fats. In addition, they are more cost effective than other sources of fats. For those reasons, PHO has become widely used in food processing. Example of foods that contain PHO are margarines and shortening, commercially baked goods, fried foods, biscuits and cake mixes, animal crackers and cookies, frozen waffles and pancakes, and microwave popcorn. Within the past 10 years, concerns about the formation of 'trans' fatty acids began to arise relative to the PHO. Trans-fats arise during the hydrogenation process when the orientation of the carbon chains on either side of the carbon bond are in the opposite plan. Trans-fats are more difficult than cis-fats to metabolize and are known to increase risk of

developing cardiovascular disease. Since 2006, trans-fats have been required to be identified on the Nutrition Facts panel, and as of 2020 PHO will no longer be allowed to be used in foods. The amounts of trans-fats present in processed foods has decreased dramatically following the nutrition labeling requirement as manufacturers have modified their ingredients to avoid the presence of trans-fats. The 2015-2020 Dietary Guidelines for American recommends people to limit their trans fats to as low as possible and the American Heart Association recommends no more than 1% of trans-fat in the diet (3).

Cholesterol is a member of the lipid family, but it is not a fat and does not provide energy. Cholesterol is produced in all animal tissues but not plants. Therefore, animal-derived foods such as meat, dairy and eggs are the only dietary sources of cholesterol. Cholesterol has many functions in the body. It is a precursor for a wide range of molecules including bile salts that facilitate fat digestion, and the steroid hormones, cortisone, adrenaline, estrogen and testosterone. It is an essential component of all cell membranes and is found in brain and nerve tissue. Cholesterol metabolism is highly regulated, but there are several aspects of the metabolic system that can go awry leading to high blood cholesterol levels. High circulating cholesterol levels are associated with increased risk of cardiovascular disease. For some people, blood cholesterol levels are responsive to dietary cholesterol and saturated fat intake, but for others diet does not affect their cholesterol level and medication is needed. The 2015-2020 Dietary Guidelines for Americans does not limit the amount of dietary cholesterol but recommends people to consume it as little as possible (3).

Vitamins and Minerals

Vitamins are organic substances that are derived from living matter and contain carbon. Vitamins are needed in the body in small amounts to regulate metabolic processes and act as coenzymes in enzymatic systems. Vitamins are distinguished by their solubility in either fat or water. The fat-soluble vitamins are vitamins A, E, D and K. To be properly absorbed, these vitamins require adequate fat in the diet and adequate fat digestion. Once absorbed from the intestine they can be stored in the body for varying lengths of time, which can lead to problems if intake is excessive. The water-soluble vitamins include the eight B-complex vitamins (Thiamin

(B₁), Riboflavin (B₂), Pyridoxine (B₆), Cobalamin (B₁₂), Niacin, Folic Acid, Biotin, Pantothenic Acid) and vitamin C. Water-soluble vitamins are not stored in the body and therefore require more frequent intake than fat-soluble vitamins. Water-soluble vitamins tend to be more labile and can be lost from food during cooking or storage. The basic functions, deficiency disease and sources of vitamins can be found at Appendix B (1).

Minerals are inorganic substances that provide structure and support to the body. Unlike vitamins, minerals become part of the body composition. Minerals make up about 4 percent of total body weight and they cannot be destroyed in food production. Major minerals are present in the body in amounts of 5 grams or more and require 100 milligrams or more intake per day. The seven major minerals are calcium, sodium, potassium, phosphorus, magnesium, sulfur and chloride. In contrast, trace minerals are present at less than 5 grams in the body and require less than 100 milligrams intake per day. The trace minerals are iron, iodine, fluoride, zinc, selenium, chromium, copper, manganese, cobalt, molybdenum. The functions, sign and symptoms of deficiency and excess, and sources in common food can be found at Appendix C (1).

Water

Water is an essential component of all body cells. It contributes to more than half of the body weight. For example, 70% of muscle, 20% of fat and 10% bone tissue is water. Humans can live without food for a month but only 6 days without water. Water gives the shape and form to cells and maintains the structure of larger molecules. Water creates blood volume and blood pressure while transporting nutrients to and waste away from cells. Water serves as a lubricant and a solvent and helps to regulate body temperature. Water acts as a medium and participants in chemical reactions. Water is usually obtained from both beverages and foods. On average, people consume four cups of water from food every day. Moreover, water is produced via metabolism and approximately one cup of water is produced per day in the average person. On the other hand, water is lost from the body via perspiration through the skin, urine through the kidney, feces through the gastrointestinal tract, and breathing through lungs.

In conclusion, all macronutrients provide a source of energy. Fat is the greatest source of energy for the body. One gram of fat provides 9 calories while one gram of protein or carbohydrate provides 4 calories. Nutrients are the building blocks for the body. Too much or too little of any nutrient may affect a chronic condition or the healing process. It is essential for the overall well-being to develop a healthy eating pattern and consume a well-balanced diet that provides all the nutrients in the correct amounts following the dietary recommendations and guidelines. It is also important for the nurses to understand the basic nutrition so that they can recommend patients with healthier choices and help them to create a nutrition balance meal when they are struggling with meal ordering.

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Modules 2 - Consistent Carbohydrate Diet

The learning objectives of this modules are to:

- understand the population who will benefit from a Consistent Carbohydrate Diet (CCD)
- describe the health risks associated with not following a CCD
- recognize the components of a CCD
- identify carbohydrate food sources and explain nutrition therapy goals for diabetes management

The CCD is beneficial for individuals who are diagnosed with diabetes mellitus. Diabetes mellitus or diabetes is defined as a heterogeneous metabolic disorder with persistent hyperglycemia (high blood glucose), which results from impaired insulin secretion, defective insulin action or both. Diabetes is diagnosed if the amount of glycosylated hemoglobin (A1C) in blood is 6.5% or higher. Pre-diabetes refers to individuals who have impaired fasting blood glucose, impaired glucose intolerance, or a A1C of 5.7 to 6.4% and not yet diagnosed with diabetes. In 2015, approximately 84.1 million people or 33.9% of adults aged 18 years or older had prediabetes (2). The number was higher in elderly population where 48.3% of elderly over 65 years had prediabetes (2). Diabetes is a very prevalent condition in the United States. According to the 2017 National Diabetes Statistic Report, 30.3 million people or 9.4% of the population had diabetes and approximately 23.8% of population with diabetes are undiagnosed (2). In 2015, diabetes was the seventh leading cause of death nationwide (2). During 2011-2012, the prevalence of chronic kidney disease was 36.5% among adults with diagnosed diabetes (2).

The common forms of diabetes are type 1, type 2 and gestational (GDM). Type 1 diabetes accounts for 5% to 10% of those with diabetes. This type of diabetes results from a cellular mediated autoimmune destruction of β -cells of the pancreas. An individual with type 1 diabetes is not able to produce insulin which prevents cells from taking up glucose from the blood stream to use for energy. Daily doses of insulin injections are required for individuals with type 1 diabetes to manage glucose utilization and prevent hyperglycemia. Patients with type 1 diabetes are more susceptible to develop other autoimmune disorders such as Graves' disease, Hashimoto's thyroiditis, Addison's disease, vitiligo, celiac disease, autoimmune hepatitis, myasthenia gravis and pernicious anemia.

Type 2 diabetes accounts for 90% to 95% of total patients with diabetes. Individuals with type 2 diabetes produce some insulin but not in an adequate amount. In addition, insulin resistance is common in type 2 diabetes, which means insulin is not as effective. Obesity is a primary cause of insulin resistance, and therefore is a comorbidity associated with type 2 diabetes. Weight loss is usually effective in improving insulin resistance. The risk factors for developing type 2 diabetes are age, obesity, lack of physical activity and dyslipidemia associated with genetic components. According to the 2017 National Diabetes Statistic Report, approximately 5,300 children and adolescents age 10 to 19 years were newly diagnosed with type 2 diabetes (2). Hence, the American Diabetes Association recommends screening children 18 years and younger who are overweight, have a family history of diabetes, or who present with signs of insulin resistance.

Gestational diabetes (GDM) is defined as glucose intolerance that occurs first during pregnancy. Pregnancy raises blood insulin levels and it is an adaptive mechanism. During the early stage of pregnancy, energy is stored in the body cells. When the pregnant woman is fasting, her tissues become insulin resistant and the fetus draws energy stores from the cells. If hyperglycemia occurs during pregnancy, the elevated blood glucose from the mother crosses the placenta and induces fetal insulin production. This can result in elevated fat deposition in the developing fetus. Thus, women with GDM tend to give birth to high birth weight infants. The prevalence of GDM is as high as 9.2% in United States, with GDM occurring in approximately 7% of all pregnancies. GDM predisposes to development of type 2 diabetes, and 5% to 10% of women with GDM will develop diabetes immediately after pregnancy. Women with GDM also have a 35% to 60% chance of developing diabetes in the next 10 to 20 years.

Glucose serves as an energy source for every cell in the human body particularly the brain and the nervous system. Insulin is the only hormone that decreases blood glucose by activating glucose receptors to move glucose from the blood into the cells. After glucose enters the cell, it may be used as fuel, stored as glycogen or converted to fat after energy and glycogen storage needs are met. Glycogen storage in the body is only about 0.4 pounds, which is equal to 800 kilocalories. Therefore, excessive glucose intake is mostly converted to fat storage. Insulin also plays an important role in protein and fat metabolism. It stimulates protein synthesis and

activates fat storage in adipose tissue. In contrast to insulin, when blood glucose levels fall below the normal range, glucagon is secreted to cause release of glucose and/or conversion of internal body protein stores to glucose via gluconeogenesis. Figure 1 illustrates glucose metabolism and regulation. In a normal individual, blood glucose concentration is carefully balanced with insulin and glucagon to prevent either hyperglycemia or hypoglycemia. In diabetes, insufficient insulin or resistance to insulin results in unmanaged blood glucose concentrations. When glucose levels rise or fall outside of the normal range, physiological consequences arise including fainting, fatigue, and weakness.

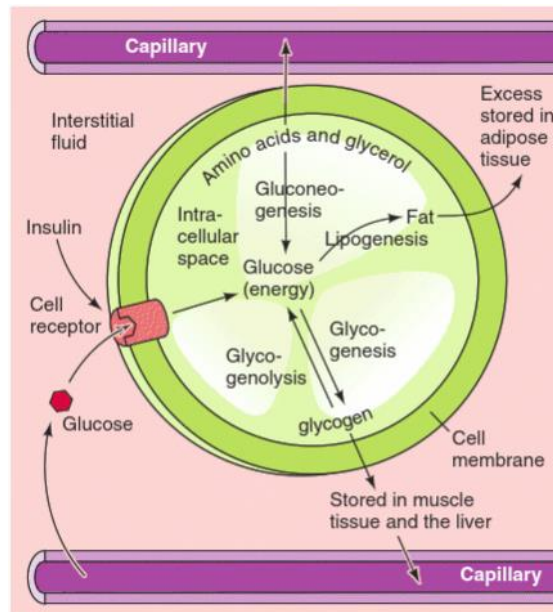


Figure 1 Glucose activity in the cells (1)

Excess glucose in the blood is filtered by the kidney and water from the blood follows the glucose which leads to increased urination. The high loss of water from the body causes excessive thirst and triggers the individual to drink more fluids. Because glucose is not available for cells to use, protein and fat are broken down for energy. This sends the signal that cells are starving, which stimulates the brain to increase appetite. Hence, the classic triad signs and symptoms for type 1 diabetes include polyuria (increased urination), polydipsia (increased thirst) and polyphagia (increased appetite). Individuals with type 2 diabetes may develop similar symptoms but are not typically as pronounced as individuals with type 1 diabetes. Untreated type 1 diabetes can be life threatening. In both types of diabetes, blood glucose levels remain elevated after eating because glucose clearance is insufficient. Weight loss is common with type 1 diabetes but

not in type 2 diabetes. Some signs and symptoms that are present in both types of diabetes include blurred vision, fatigue, infection, vaginitis, bladder infections, poor wound healing, impotence in men and kidney disorders.

The major health complications associated with diabetes are atherosclerotic conditions resulting from high blood glucose levels and damage to arterial cells. This is presented most commonly as retinopathy, neuropathy and nephropathy. Retinopathy is a disorder of the eye causing blurred vision and cataracts. In fact, diabetes is a leading cause of blindness and vision loss in the United States. Cataracts are depicted as a clouding of the lens of the eye due to protein breakdown in the lens. Disease progression is usually slow and may not impede vision early on. The only treatment available is the surgical removal of the cataract and replacement with an artificial lens. Neuropathy refers to nerve damage and is symptomatic of tingling and numbness in the extremities. Neuropathy is particularly problematic for individuals with diabetes because they may not feel pain associated with an injury. This allows the wound to go untreated, and combined with decreased blood circulation, can result in infection or even gangrene (tissue death). Common sites for such injuries are ulceration of the feet and fingers, and if untreated amputation may be necessary. Nephropathy is damage to the kidney associated with reduced blood flow. Kidney failure caused by diabetes accounts for nearly half of all new renal cases. Other forms of cardiovascular disease are also common in individuals with diabetes especially associated with small-vessel disease and arteries in the heart muscle.

The goal of medical nutritional therapy is to educate patients with diabetes on food choices and exercise habits to optimize metabolic control. Carbohydrate intake should be personalized based on nutrition assessment, laboratory results, body weight and treatment goals. Research has shown that people with diabetes improve their health when they follow dietary recommendations to control blood glucose and lipids levels. The Academy of Nutrition and Dietetics has published guidelines to help with carbohydrate management. One, establish a dietary pattern that includes carbohydrate from fruits, vegetables, whole grains, legumes and low-fat milk. Two, develop a good strategy to optimize glycemic control by monitoring carbohydrate intake by carbohydrate counting and experienced-based estimation. Three, utilize

glycemic index, substitutions of complex carbohydrates for sucrose-containing foods and increased fiber-rich foods. Four, sugar alcohol and artificial sweeteners are safe to consume.

MyPlate was introduced in 2011 to help the general population to create healthier eating styles (6). Figure 2 illustrates the colorful visual of MyPlate and the five food groups. The American Diabetes Association has developed a diabetic version of MyPlate (Figure 3) to assist patients with their diet management. This can help people with diabetes visualize a healthy and balanced meal on their plate. Half of the plate should be filled with non-starchy vegetables, a quarter is reserved for starchy food, and another quarter is filled with low-fat proteins. The meal will be completed by a cup of low-fat or skim milk or 6 ounces of low-fat-no-sugar added yogurt, and a small piece of fruit or half a cup of no sugar added fruit salad.

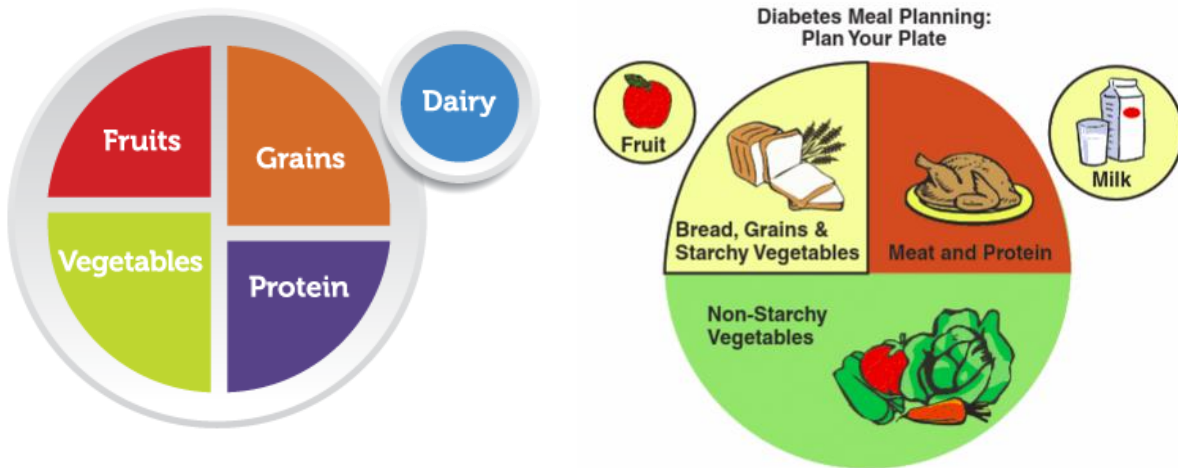


Figure 2 MyPlate for General Population (6) Figure 3 MyPlate for people with diabetes (1)

Because carbohydrates are the major macronutrient influencing blood glucose levels, it is important to consume a consistent amount at each meal and snack, based on daily calorie intake. A Consistent Carbohydrate Diet (CCD) is prescribed for patients with diabetes based on their individual eating habits, and blood glucose and lipid goals. The protein and fat composition of foods indirectly affect blood glucose levels and can contribute to lipid abnormalities and weight gain. These nutrients also provide calories and additional intake beyond energy needs will be stored as fat. Saturated fats and trans-fat contribute to increased blood lipid levels which along with excess blood glucose can increase the risk for hypertension and heart disease.

A CCD is not a low carbohydrate diet. It is incorrectly believed by patients that in order to control their diabetes they must avoid all carbohydrates. Carbohydrates are an important component of the diet to provide cellular energy, and therefore individuals with diabetes should not eliminate carbohydrates from their diet. Consuming more carbohydrates than required leads to uncontrolled blood glucose, weight gain and the associated chronic diseases. Registered Dietitians in Michigan Medicine teach patients with diabetes how to determine their carbohydrate requirements, read food labels and understand the importance of serving sizes. They also teach patients how to modify their current diet to incorporate more healthful food choices which will enable them to prevent complications. Providing appropriate food choices while the patients with diabetes are in the hospital is also an important learning tool.

Consistent Carbohydrate Diets available at Michigan Medicine are 45 grams, 60 grams, 75 grams or 90 grams per meal period. For example, a patient who is prescribed a 60 grams consistent carbohydrate diet is allowed 60 grams of carbohydrates for breakfast, lunch and dinner totaling 180 grams of carbohydrates per day. Obstetric diabetic diet is available for women with GDM. This diet allows 45 grams of carbohydrates for breakfast and lunch and 60 grams of carbohydrates for dinner with three snacks in between meals. Consistent Carbohydrate Diets for the pediatric population are developed based on age and gender (Table 1).

Age	Allowed Carbohydrate per Meal
1-2 years old (male and female)	30 grams
3-6 years old (male and female)	45 grams
7-10 years old (male and female)	60 grams
11-18 years old (male)	90 grams
11-14 years old (female)	60 grams
15-18 years old (female)	75 grams

Table 1 CCDs for pediatric population

Sources of carbohydrates were discussed during the previous module. It is important to understand that complex carbohydrates take longer to be digested and absorbed compared to simple sugars. Thus, complex carbohydrates provide patients with more consistent blood glucose levels. Complex sugars also provide important nutrients such as vitamins, minerals, and fiber. Fiber is also important because it increases satiety. The grams of carbohydrates in food options

are printed on the menu to assist patients with their meal selections. A half portion of an entrée is often offered to provide extra options. Patients with diabetes should refrain from skipping meals to prevent low blood sugar or hypoglycemia, read the food labels and measure serving sizes, and be physically active. The goal of the CCD is to develop a meal plan that is feasible and easily integrated into the patient's lifestyle. An example of meal plan based on the Express menu can be found in Appendix D. Nurses in AES play a very important role in assisting patients with their meal selections. Hence, nurses should ensure patients follow their prescribed diet and order the meal within their carbohydrate limits to maintain a consistent blood glucose.

In conclusion, diabetes is a group of disorders with common signs of hyperglycemia due to under secretion (type 1) or underutilization of insulin (type 2). People with diabetes are at risk for various health complications including retinopathy, neuropathy and nephropathy. The Consistent Carbohydrate Diet is an essential component of diabetes management and prevents progression of disease and related complications. The amount of carbohydrates per meal period is individually defined according to age, eating habits, blood glucose and lipid goals.

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Module 3 - Cardiac and Low Sodium Diet

The learning objectives of this module are to

- identify the disease states that require cardiac and other sodium restricted diets
- recognize the nutrient goals of the cardiac diet order
- identify the types of sodium restricted diets offered at Michigan Medicine
- distinguish food items that are compliant for cardiac diet from the Express menu

Cardiovascular disease (CVD) includes atherosclerosis, hypertension, coronary heart disease (CHD), and heart failure. Although deaths from cardiac diseases and stroke have decreased by 35.7% and 32.5%, respectively in 2010 (1), heart disease continues to be the number one leading cause of death in the United States (2). CHD (43.8%) is the leading cause of death attributed to CVD, followed by stroke (16.8%), high blood pressure (9.4%), heart failure (9.0%), artery diseases (3.1%) and other CVDs (17.9%) (2). By 2035, it is estimated that more than 130 million adults in United States will have some form of CVD and total cost of CVD are expected to reach \$1.1 trillion (2).

Atherosclerosis is the narrowing and loss of elasticity of blood vessel walls due to plaque or fatty deposits of cholesterol, fat or other substances (3). The measure of elasticity of the arterial system is blood pressure. Normal blood pressure is less than 120/80mm Hg. The upper number of a blood pressure reading is systolic pressure, which refers to the pressure when the heart beats. The lower number is diastolic pressure, which refers to the pressure between heart beats. Hypertension refers to high blood pressure readings of 140/90 mm Hg or higher on at least three times and dates (3). In the US 1 in 3 adults or 75 million people have hypertension (4). Chronic hypertension is associated with increased risk of heart attack, stroke, kidney failure and other blood vessel conditions. Hypertension is a leading risk factor for CHD and stroke (3). It has been estimated that if an individual with hypertension reduced their sodium intake from 3300 to 2300 milligram (mg) per day, the incidence of hypertension would decrease by 11 million cases and health care costs would be cut by \$18 billion annually.

CHD is defined as the narrowing of small vessels that provide oxygen to the heart. Coronary occlusion occurs when oxygen and nutrients are prevented from reaching a region of the heart because of blockage of an artery from atherosclerotic plaque, thrombus (blood clot),

or embolus (a circulating mass of undissolved matter). Heart attack or myocardial infarction (MI) is diagnosed when the blood supply cannot be restored quickly, and results in myocardial cell death in the affected area. In the United States, strokes occur approximately every 40 seconds and deaths from stroke occur on average every 4 minutes. Research has found that a diet low in sodium, high in potassium and rich in fruits, vegetables, whole grains, cereal fiber, and fatty fish reduces the incidence of stroke (3).

Heart failure (HF) occurs when the heart cannot provide adequate blood flow to the rest of the body. The causes of HF are atherosclerosis, hypertension, myocardial infarction, rheumatic fever, birth defect, obesity, and diabetes. Regular exercise, moderate alcohol intake, consumption of fruits and vegetables, and consumption of fish or supplements high in omega-3 polyunsaturated fatty acids lowers the risk of developing HF (3). In addition, the American Heart Association (AHA) recommends individuals with HF to receive pharmaceutical treatment for hypertension, dyslipidemia, obesity and diabetes. A very reduced sodium intake of 1500 milligram per day is recommended to modify risk factors and treat structural heart diseases in patients with HF, whereas a more modest sodium intake of less than 3000 milligrams per day is generally recommended to prevent HF (5).

Some risk factors of CVD are modifiable, and some are not. Risk factors that cannot be changed to prevent CVD are age, gender, race, heredity, family history, and personal medical history. The major modifiable risk factors for CVD are hypertension, elevated serum cholesterol, obesity, diabetes mellitus, physical inactivity, alcohol intake and smoking. Between 2011 and 2014, a higher percentage of males rather than females, aged 64 or younger, had hypertension (2). On the other hand, hypertension was more problematic in females than males aged 65 or older (2). The prevalence of hypertension in African Americans are among the highest in the world. Between 2011 and 2014, the age-adjusted prevalence of hypertension was 45.0% and 46.3% among non-Hispanic black males and females when comparing to 34.5% and 32.3% among non-Hispanic white males and females, respectively (2). A reported family history of premature parental CVD increases a person's risk of CVD, especially MI and CHD (2). Premature CVD refers to the occurrence of heart attack at the age of 50 or younger (2). Individuals with family history of high blood cholesterol and lipids are at a 20-fold increased risk to develop CVD (2).

Cholesterol is an important component of every cell membrane, especially the nerve tissues of brain and spinal cord. Cholesterol is a precursor for many hormones (such as adrenal hormones and sex hormones) and regulatory molecules. Cholesterol synthesizes bile acids, which facilitate lipid absorption from the diet. Cholesterol can be synthesized in the body especially liver and intestine or can be obtained via dietary intake. The body will produce less cholesterol or increase the cholesterol excretion when dietary cholesterol intake is high. Cholesterol is a sterol with fatlike properties and cannot dissolve in water. It is bound to lipoprotein to travel in bloodstream. The four main classes of lipoproteins are chylomicrons, very low-density lipoproteins (VLDL), low-density lipoproteins (LDLs), and high-density lipoproteins (HDLs). Their functions and significance are illustrated in Table 1. Elevated LDLs was associated with an increased risk of stroke (2) and CHD (3). LDL management via lifestyle and dietary changes has shown the risk reduction in CVD (Table 2).

LIPOPROTEIN	FUNCTION	CLINICAL SIGNIFICANCE
Chylomicrons	Transport exogenous triglycerides from intestines to blood stream	Formed in small intestine; present in blood only after a meal
VLDL	Main transporter of endogenous triglyceride	Synthesized by liver from free fatty acids, glycerol, and carbohydrate
LDL	Transports cholesterol to body cells	Evolves from VLDLs as body's cells remove triglyceride from them and attach cholesterol Carrier of about 60% of total serum cholesterol The higher the LDL level, the greater the risk of CHD Major target of cholesterol-reducing therapy
HDL	Transports cholesterol from body cells to liver to be excreted Inhibits atherosclerosis through anti-inflammatory, antioxidant and antithrombotic actions (Hausenloy and Yellon, 2008)	Synthesized by liver and intestines The higher the HDL level, the lower the risk of CHD Aerobic exercise increases HDL levels

CHD, coronary heart disease; HDL, high-density lipoprotein cholesterol; LDL, low-density lipoprotein cholesterol; VLDL, very low density lipoprotein cholesterol.

Table 1 Functions and significance of various lipoproteins (3)

BEHAVIOR	GOAL	APPROXIMATE LDL-C REDUCTION	APPROXIMATE SYSTOLIC B/P REDUCTION	APPROXIMATE ATHEROSCLEROTIC CARDIOVASCULAR DISEASE RISK REDUCTION
Optimize Diet	Consume <7% kcal as saturated fat (including <1% as <i>trans</i> -fat)	8%–10%		8%–10%
	Consume <200 mg cholesterol daily	3%–5%		3%
	Consume 5–10 g soluble fiber daily	3%–5%		<1%
	Limit sodium intake to 2300 mg daily		2–8 mm Hg	3%
	Eat 5 servings fruit, vegetables daily		8–14 mm Hg	5%
	Limit alcohol to 1 (women) or 2 (men) standard drinks per day		2–4 mm Hg	10%
	Possibly consume plant sterol/stanol enriched foods, 2 g daily	6%–10%		3%
Other	10 lb weight loss	5%–8%	5–10 mm Hg	10%
	Moderate exercise 30 min daily		4–9 mm Hg	10%
	Smoking cessation			(some due to B/P change) 20%

LDL-C, low-density lipoprotein cholesterol.

Table 2 Lifestyle and dietary changes proven to reduce LDLs and the risk of CVD (3)

Obesity is one of the major modifiable risk factors for CHD. For instance, abdominal obesity is associated with increased risk of hypertension, abnormal blood lipid profiles, and type 2 diabetes (6). Abdominal obesity is defined as waist circumference of >40 inches in men and > 45 inches in women (3, 6). Even modest weight loss (5-10%) is shown to improve both lipid level and blood pressure (3). In addition, the risk of developing atherosclerosis in individuals with diabetes is two to three-fold higher than other people. Insulin is essential to maintain adequate levels of lipoprotein lipase, which breaks down lipids. Inadequate insulin in diabetes leads to inadequate lipoprotein lipase and increase lipids accumulation in the blood. Serum lipid levels will decrease after the diabetes is controlled. Physical activity is another modifiable risk factor for CVD. Physical inactivity is associated with high blood pressure independent of being overweight in both sexes and across all ages. Increased physical activity increases HDLs and reduces the risk of CVD (3). Moreover, alcohol consumption and cigarette smoking are associated with increased risk of CVD. High doses of alcohol cause vasoconstriction and is associated with the risk for hemorrhagic stroke (3). Whereas, cigarette smoking, whether from active or secondhand smoke, has been shown to increase LDLs (3). Smokers tend to develop CHD 10 years earlier than non-smoker (3).

The AHA's new 2020 goal is to improve cardiovascular health of all Americans by 20% and to reduce deaths from cardiovascular diseases and stroke by 20% (1). The AHA designed the "Life's Simple 7" tool (2) to target modifiable factors and behaviors associated with CVD. The seven approaches to stay heart healthy are

1. manage blood pressure
2. control cholesterol
3. reduce blood sugar
4. be active
5. eat a heart healthy diet
6. keep a healthy weight
7. stop smoking

In addition, the AHA recommends an adult who requires 2000 calories per day consume less than 7% of total energy intake from saturated fat. On daily basis, an individual should consume at least

4.5 cups of fruits and vegetables, at least three 1-ounce equivalent servings of fiber-rich whole grains, and less than 1500 milligrams of sodium. On weekly basis, an individual should consume at least two 3.5-ounce servings of fish, at least 4 servings of nuts, legumes, and seeds, no more than 2 servings of processed meats and no more than 450 calories from sugar-sweetened beverages. The Dietary Approaches to Stop Hypertension (DASH) diet (Table 3) is associated with lower blood pressure in African American and White adults (3). The nutrient goals for the DASH diet are no more than 27% fat, 18% protein, 55% carbohydrate, 2300 mg or less sodium, 4700 mg of potassium, 1250 mg calcium, 500mg magnesium and 30 g fiber per day (3).

FOOD GROUP	DAILY SERVINGS	SERVING SIZES	EXAMPLES AND NOTES	SIGNIFICANCE OF FOOD GROUP TO DASH DIET
Grains and Grain Products (whole grains are recommended)	6–8	1 slice bread ½ cup dry cereal ½ cup cooked cereal, brown rice, or pasta	Whole-wheat bread, English muffin, pita bread, bagel, cereals, grits, oatmeal	Major sources of energy and fiber
Vegetables	4–5	1 cup raw leafy ½ cup cooked 6-oz juice	Tomatoes, potatoes, carrots, peas, squash, broccoli, turnip greens, collards, kale, spinach, artichokes, sweet potatoes, beans	Rich sources of potassium, magnesium, and fiber
Fruits	4–5	6 oz juice 1 medium fruit ¼ cup dried fruit ½ cup fresh, frozen, or canned fruit	Apricots, bananas, dates, oranges, grapefruit, mangoes, melons, peaches, pineapples, prunes, raisins, strawberries, tangerines	Important sources of potassium, magnesium, and fiber
Low-Fat or Nonfat Dairy Foods	2–3	8 oz milk 1 cup yogurt 1.5 oz cheese	Skim or 1% milk, skim or low-fat buttermilk, nonfat or low-fat yogurt, part-skim mozzarella cheese, nonfat cheese	Major sources of calcium and protein
Meats, Poultry, and Fish	6 or fewer	3 oz cooked meat, poultry, or fish	Select only lean; trim away visible fat, broil, roast, or boil instead of frying; remove skin from poultry	Rich sources of protein and magnesium
Nuts, Seeds, and Legumes	4–5 per week	1.5 oz or ¼ cup nuts ½ oz or 2 tbsp seeds ½ cup cooked legumes	Almonds, filberts, mixed nuts, peanuts, walnuts, sunflower seeds, kidney beans, lentils	Rich sources of energy, magnesium, potassium, protein, and fiber
Fats and Oils	2–3	1 tsp	Canola, olive, peanut oils	Contain mainly monounsaturated fatty acids

Table 3 The DASH diet based on a 2000 calories diet (3)

The average American consumes 3400 mg of sodium per day whereas the 2015-2020 Dietary Guidelines for Americans recommends 2300 mg of sodium or less per day (6). One teaspoon of salt contains approximately 2300mg of sodium. Therefore, a single teaspoon of table salt per day is the maximum recommended intake. According to the 2015-2020 American Guidelines, mixed dishes such as burgers and sandwiches, rice, pasta and grain dishes, meat poultry, and seafood dishes, pizza and soups are the frequently consumption food items that contribute to the high sodium intake (Figure 1). Other common food sources that are high in sodium include bacon, canned vegetables and protein, commercial soups, condiments, dairy

products, deli meats, grain products, pickles and olives, ready-to-eat cereals, salad dressing, and sausage.

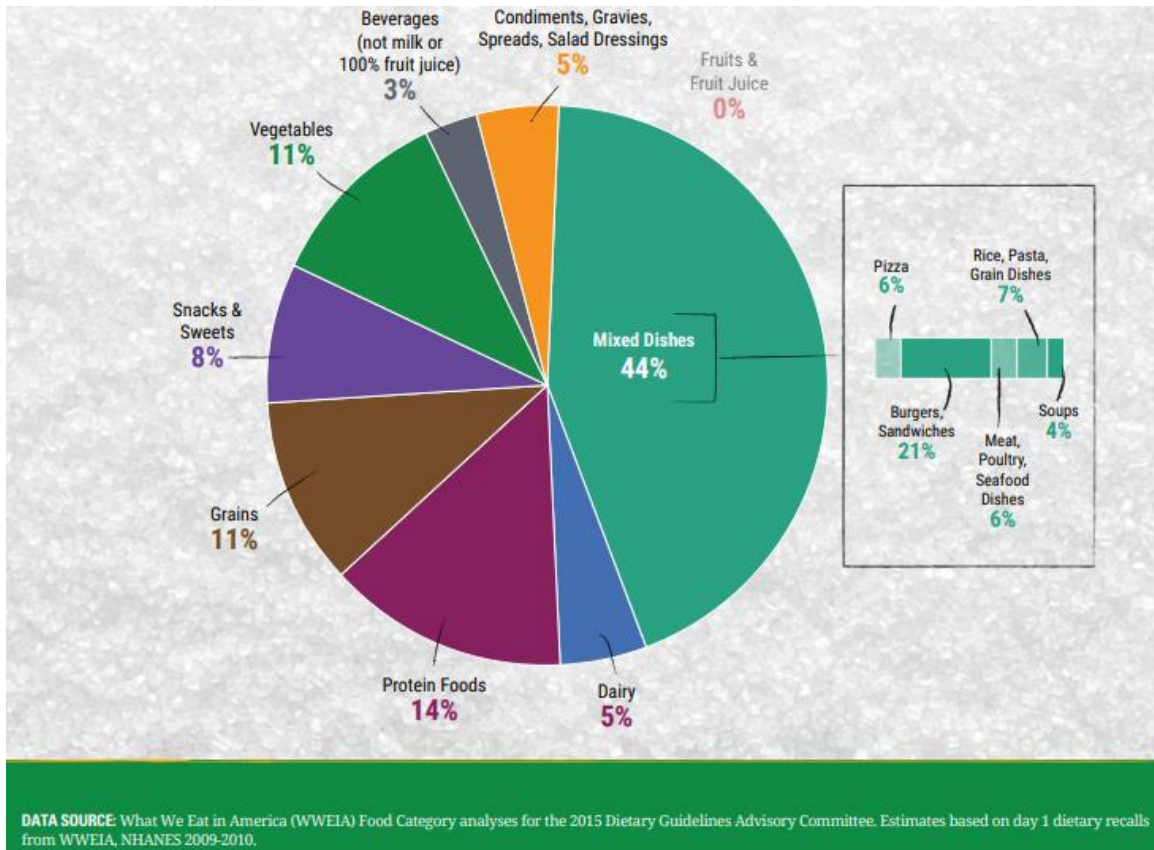


Figure 1 Food category sources of sodium intake in in the U.S. population (6)

Potassium is a counter-balance to sodium and lessens its effect on blood pressure. Potassium helps to relax the blood vessels walls and increases the output of sodium through urine. Example of high potassium foods include fruits, vegetables and low-fat dairy products. However, potassium supplements have not been found to be effective in decreasing CVD occurrence. Thus, the AHA does not recommended potassium supplements for individuals with heart disease (3).

Saturated fats and trans-fat are associated with increasing blood LDL-C levels (7). On the other hand, unsaturated fats reduce the risk of CVD (7). An example of fats and fatty acids are illustrated in figure 2. The oils and fats that are used in food items provided by PFANS are corn oil, extra virgin olive oil, 80/20 blended-oil (80% soy and canola oil, 20% pomace olive oil), sesame oil, ZOYE natural butter flavor oil (made with soy), Vegalene pan spray (xanola oil), ZTF margarine, and unsalted butter. All food items provided by PFANS are trans-fat free.

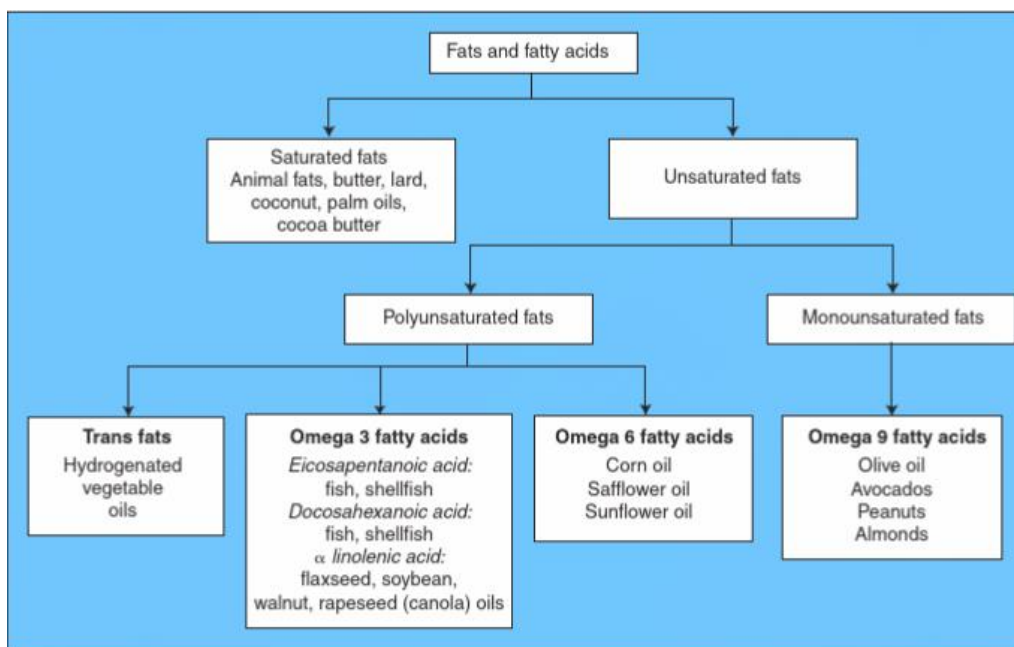


Figure 2 Fatty acids and their common food sources (3)

In Michigan Medicine, saturated fat and sodium are restricted on a cardiac diet. Patients on cardiac diet are limited to food items that contain 2.5 grams or less of saturated fat per serving, less than 5 grams of saturated fats per meal and total of 20 g of saturated fat per day. Cardiac patients are limited to 3 grams of sodium per day. Other sodium restricted diets are available for patients with hypertension or fluid retention often resulting from cardiovascular, renal or liver disease. Table 4 illustrates the sodium allowance for different level of sodium restricted diets.

Sodium Allowance	No Added Salt	Reduced Sodium	Low Sodium
Per day	4 grams	3 grams	2 grams
Per meal	1333 milligrams or less	1000 milligrams or less	667 milligrams or less
Per serving	1000 milligrams or less	700 milligrams or less	400 milligrams or less

Table 4 Sodium allowance on sodium restricted diet

PFANS develops recipes in-house to meet the requirements for sodium and other nutrient restricted diets. Several methods are used to reduce sodium content in recipes. First, rice, pasta, and hot cereals are cooked in water without adding salt. High-heat cooking techniques such as pan-searing, grilling, broiling, or braising are used for proteins to brown meat and add flavor. Onions are caramelized to bring out their natural sugar flavor. Some recipes include acidic

ingredients such as citrus juice and vinegars to enhance and balance flavor. And salt-free spices and herbs are used in recipes instead of salt.

Patients on cardiac or sodium restricted diets are recommended to choose lean proteins such as chicken and turkey over red meats such as pot roast, hamburger and meatloaf. Skim milk and sherbet are preferable over 2% milk and ice cream. While cheese is generally high in fat and sodium, patients should avoid mac and cheese, grilled cheese sandwiches, and sliced cheese for sandwiches. Desserts and baked goods are usually high in saturated fats. Thus, patients should avoid chocolate layer cake, cheesecake, apple crisp and banana nuts muffin and select lemon ice, Jell-O, sherbets, popcorn, Rice Krispie treats or granola bars. Fruits, vegetables and whole grains are highly recommended for this patient population. Express menu ordering guide for cardiac diet can be found in Appendix E. It is important for nurses in AES to understand cardiac diet restriction and food items that are high or low in saturated fat and sodium. Nurses can then improve their cardiac patients' meal selections by utilizing the knowledge they acquired from this module.

In conclusion, heart disease is the number one leading cause of death in the United States. Saturated fats are associated with increased blood LDL level and increased risk of CHD. Thus, saturated fat intake is limited on a cardiac diet. In addition, lower sodium intake can improve hypertension and reduce the risk of CVD. Hence, sodium is also restricted on a cardiac diet. Consuming a diet rich in fruits, vegetables, whole grains, and lean animal products with limited intake of added sugar, cholesterol, saturated fats and trans fats can help to reduce the development of cardiovascular disease.

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Module 4 - Renal Diet

The learning objectives of this module are to

- understand the major functions of the kidney
- identify the different stages and progression of kidney disease
- understand the restriction of certain nutrients in a renal diet
- identify the renal diets available in Michigan Medicine
- recognize the associated risk of not adhering to the renal diet
- classify food items that are high and low in potassium, phosphorus, and sodium

Renal refers to the kidneys. Humans have two kidneys, and each is composed of approximately one million functioning units called nephrons. Each nephron contains a filtering unit called a glomerulus that is attached to a series of renal tubules (Figure 1). The glomerulus filters the blood and extra fluids and wastes moves through the tubules which reabsorb selected factors and excrete wastes in urine (1).

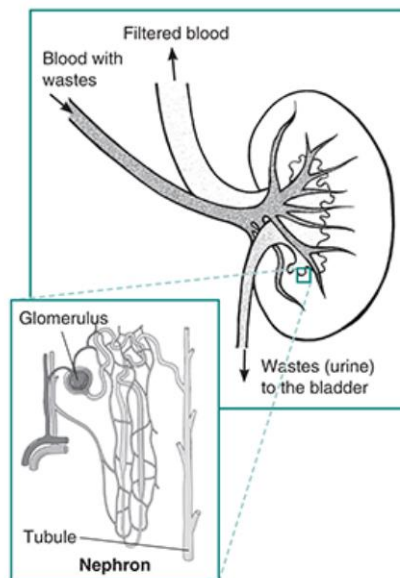


Figure 1 Diagram illustrates nephron, glomerulus and tubule (1)

The kidneys play important roles in metabolic regulation. They filter unneeded chloride, potassium, sodium, and hydrogen ions from the blood. They also remove waste from the blood and excrete into the urine end products of metabolism and substances such as urea, creatinine, uric acid and urates. The kidneys reabsorb previous filtered substances such as water and sodium

into the blood when required to maintain fluid balance. The kidneys maintain acid-base balance by the secretion and the exchange of hydrogen ions for sodium ions. In addition, the kidneys release hormones that control cardiac output and systemic blood pressure. They produce erythropoietin, a hormone that controls the production of red blood cells in bone marrow. The kidneys produce an active form of vitamin D, which help regulate absorption of calcium and phosphorus from the intestinal tract and maintains skeletal bone structure.

Because the kidneys have such important functions in the body, decreased kidney function has serious consequences and nutritional care of patients with renal disease is complex. The most common type of kidney disease is glomerulonephritis, which is inflammation of the glomeruli. Symptoms include nausea, vomiting, fever, hypertension, hematuria (blood in the urine), oliguria (decreased urine output), proteinuria (protein in the urine) and edema. When a glomerulus is inflamed, and a nephron is damaged, other nephrons work harder to maintain metabolic homeostasis in the body. When sufficient nephrons are damaged, kidney function is compromised resulting in insufficient filtration of the blood.

Kidney disease can be acute or chronic. In acute renal failure, the kidneys stop working entirely or almost entirely temporary for a few days or weeks. In chronic kidney disease (CKD), more nephrons are destroyed over time until the kidneys cannot perform vital functions. Scarred nephrons cannot be repaired, and CKD may eventually lead to end-stage renal failure (ESRD), which requires dialysis or a kidney transplant. Glomerular Filtration Rate (GFR) is defined as the fluid filtration rate at each minute by all the glomeruli from both kidneys and is used to measure kidney function. The normal rate is about 125 milliliters per minute. The severity of kidney damage is higher as the GFR decreases (table 1).

STAGE	GFR
1. Some kidney damage with normal or elevated GFR	≥90
2. Kidney damage with mildly decreased GFR	60–89
3. Moderately decreased GFR	30–59
4. Severely decreased GFR	15–29
5. Kidney failure	<15 Dialysis, transplant, hospice, or palliative care Diet may provide comfort

Table 1 Stages of CKD and GFR in milliliters per minute (2)

Obesity, poorly controlled diabetes and hypertension are the main conditions that lead to kidney disease (2). In 2014, Medicare spent more than \$50 billion caring for people 65 years old and older with CKD (3). Over 70% of this spending was attributed to patients who had comorbid diabetes mellitus and congestive heart failure (3). More than two thirds of patients with CKD who are 66 years old and older have cardiovascular diseases (CVD). The prevalence of CVD in patients with ESRD varies by treatment methods. For example, 74% of patients with ESRD who are on hemodialysis and 55% of patients with kidney transplant have any CVD (3). The National Kidney Disease Education Program recommends diet therapy to slow the progression of CKD by controlling blood pressure, managing diabetes and reducing excessive protein intake (2). Other causes of renal disease are trauma, infections, birth defects, medications, toxic metal consumption and genetic mutations.

Renal functions cannot be replaced by another organ and there is no cure for chronic renal failure. The treatments for renal failures are dialysis (an artificial kidney) or a kidney transplant. Dialysis assumes renal functions to remove waste products and regulate fluid and electrolyte balance in the body. Dialysis reduces the symptoms of uremia, hypertension, edema and the risk of CHF. Uremia refers to the retention of nitrogenous substances in the blood, which are normally excreted by the kidneys. Edema means the accumulation of excessive amounts of fluids between the cells. There are two types of dialysis; hemodialysis and peritoneal dialysis. During hemodialysis, the dialysis machine pumps blood from the patient's artery through a tube with a semipermeable membrane. As the blood passes through the tube, a solution called dialysate passes in the opposite direction on the outside of the tube. Waste products are move from the blood into the dialysate. Filtered blood then is rerouted back into the patient's body through a vein. Hemodialysis treatment is required three times per week and each time usually takes three to four hours to complete. During peritoneal dialysis, the dialysate is placed directly into patient's abdomen via a permanent catheter that is implanted between the abdominal wall and the peritoneum (lining of the abdominal cavity). Dialysate absorbs waste products and excess fluid from the blood by using the peritoneum as a filter. Different glucose concentrations are used in the dialysate to monitor the amount of fluid removed. More calories are absorbed if a higher glucose concentration is used.

The decision of the treatment is based on the patient's medical condition, lifestyle and personal preference.

34% of patients on hemodialysis are estimated to have moderate to severe malnutrition due to increased catabolism, decreased food intake (poor appetite and/or nutrient restrictions) and low economic status (2). Therefore, renal patients require constant nutrition assessment, monitoring and counseling. According to the Academy of Nutrition and Dietetics, coordination of care among all medical team members is important in the practice guidelines for medical nutrition therapy for CKD (2). The goals of nutrition therapy for patients with CKD are to achieve and maintain optimal nutrition status, prevent net protein catabolism, minimize uremic toxicity, maintain adequate hydration status, maintain normal serum potassium levels, control the progression of renal osteodystrophy, follow restrictions to meet other nutrition-related concerns, such as diabetes, heart disease, etc., slow the progression of renal failure and postpone the initiation of dialysis.

Sodium, potassium and phosphorus are the three main micronutrients that are monitored and controlled closely in renal diets. Dietary sodium consumption is recommended based on blood pressure and fluid balance as well as other comorbidities such as congestive heart failure. High sodium intake stimulates thirst and thus fluid intake. Sodium restriction is required to prevent sodium retention and edema. Sodium restriction is also important for renal disease that is associated with high blood pressure such as glomerulonephritis. Renal patients who have a normal or low blood pressure, low blood sodium and no edema, such as pyelonephritis, may be allowed a higher amount of dietary sodium. Examples of high sodium foods include snack foods like chips and crackers, canned soups and vegetables, frozen entrees, and processed meats and cheeses. A pictorial handout of high sodium food can be found in Appendix F (4). Fluid restriction is required sometimes along with low sodium (2 gram) restriction for patients who have fluid issues such as edema. Fluid restriction guidelines from Michigan Medicine can be found in Appendix G (4).

Potassium is a mineral that is required for the conduction of nerve impulses and the contraction of muscles, including the heart. Hyperkalemia or high potassium level leads to skeletal muscle weakness, followed by cardiac dysfunction such as cardiac arrhythmias or abnormal heart rhythms. In contrast, hypokalemia or low potassium level may lead to cardiac arrhythmias and

eventually cardiac arrest. The amount of potassium required by renal patients varies depending on their kidney function. The degree of restriction is based on laboratory potassium assessment. Most renal patients are recommended to consume 2 to 3 grams of potassium daily (2). Potassium intake should be limited to 2.4 grams or less per day for patients who have elevated serum potassium of 5 to 6.5 milli-equivalents per liter (mEq/L). If the serum potassium exceeds 6.5 mEq/L, potassium intake should be limited to 780 to 975 milligrams per day. Examples of high potassium foods include bananas, oranges, potatoes, tomatoes, bran cereals, and milk. Some salt substitutes and low-sodium foods contain potassium chloride and should be avoided. Examples of low potassium foods are apples, grapes, cabbage, carrots, green beans, cucumbers and bell peppers. A pictorial handout of acceptable and high potassium foods can be found in Appendix H (4).

Phosphorus is a mineral that is required along with calcium for bone health. Individuals with kidney disease are not able to activate vitamin D which can lead to low serum calcium levels. This can be exacerbated if the kidneys cannot excrete the phosphorus from the body, resulting in elevated serum phosphorus which causes calcium to be pulled from bones making bones thin, weak, and increases risk of fracture. Calcium removed from the bones is deposited in non-bone cells such as blood vessels, heart, joints, muscles, and skin causing calcification. For example, vascular calcification causes cardiovascular diseases in many individuals with CKD. Phosphorus needs vary depending on the individual's kidney function and restriction is based on phosphorus laboratory analysis. Renal patients with stages 5 CKD should restrict dietary phosphorus to 800 to 1000 mg per day (2). Examples of high phosphorus foods are meat, poultry, fish, dairy products, nuts, peanut butter and seeds, bran breads and cereals, colas, and chocolate. Examples of low phosphorus foods are fresh fruits and vegetables, rice milk, white bread and pasta, rice, and corn and rice cereals. A pictorial handout of acceptable and high potassium food can be found in Appendix I (4). Some renal patients especially those with stage 3 through 5 CKD may require phosphate binders if the dietary modification does not produce desired results. Phosphate binders are used to bind phosphorus in the gastrointestinal tract causing it to be excreted via the feces.

Because protein foods are high in phosphorus, it is important that patients with kidney disease consume at least 50% of protein with high biologic value (BV). High BV proteins are protein sources that contain all essential amino acids such as eggs, meat and dairy products. However,

individuals with renal failure may also benefit from a vegetarian diet. Studies have shown increased survival rates and decreased proteinuria, renal blood flow, and histological renal damage in vegetarian diets comprised of plant proteins. Vegetarian diets are generally high in potassium and phosphorus. The right combination of plant proteins is very important to balance the consumption of protein, potassium and phosphorus. **Vegetarians who have kidney disease should be referred to a renal dietitian for dietary advice.**

The nutritional care of renal disease is very complex especially as the nutrient modification is different for each stage of CKD (Table 2). A renal diet at Michigan Medicine is restricted to a maximum of 70 mEq potassium, low phosphorus and no added salt (4-gram sodium) (Table 3). Other available diets for renal patients include 60, 70 or 80 mEq of potassium, 2 grams or 3 grams sodium, no added salt and fluid restrictions. All these micronutrients can be modified based on the patient’s lab values and other medical issues.

NUTRITIONAL PARAMETER	NORMAL KIDNEY FUNCTION	STAGES 1–4 CHRONIC KIDNEY DISEASE	STAGE 5 HEMODIALYSIS	STAGE 5 PERITONEAL DIALYSIS	TRANSPLANT
Calories (kcal/kg per day)	30–37	<60 years: 35 >60 years: 30–35	<60 years: 35 >60 years: 30–35	<60 years: 35 including calories from dialysis	Initial: 30–35 Maintenance: 25–30
Protein (grams/kg per day)	0.8	0.6–0.75 50% HBV	1.2 50% HBV	1.2–1.3 50% HBV	Initial: 1.3–1.5
Fat (percent total kcal)	30%–35% Patients considered at highest risk for cardiovascular disease: emphasis on <10% saturated fat, PUFA, MUFA, 250–300 mg cholesterol/day				
Sodium (mg/day)	<2300 mg/day*	≤1500 mg/day [†]	≤1500 mg/day [†]	≤1500 mg/day [†]	<2300 mg/day*; monitor medication effect
Potassium (mg/day)	Unrestricted	Correlated to laboratory values	2000–3000 (8–17 mg/kg per day)	3000–4000 (8–17 mg/kg per day)	Unrestricted; monitor medication effect
Calcium (mg/day)	Unrestricted	1200	<2000 from diet and medications	<2000 from diet and medications	1200
Phosphorus (mg/day)	Unrestricted	Correlated to laboratory values	800–1000, adjusted for protein	800–1000, adjusted for protein	Unrestricted unless indicated
Fluid (mL/day)	Unrestricted	Unrestricted with normal urine output	1000 + urine output	Monitored; 1500–2000	Unrestricted unless indicated

Table 2 Selected nutritional parameters for varying levels of kidney failure (2)

	Potassium	Phosphorus	Sodium
Entrée	Contains less than 400mg per serving	Contains less than 200mg per serving	Contains 1000mg or less of sodium per serving
Side	Contains less than 300mg per serving	Contains less than 100mg per serving	

Table 3 Nutrients restriction for Renal Diet in Michigan Medicine

Renal patients should comply with the guidelines and order food items within the restrictions. A few popular food items that are not allowed on renal diet are mac and cheese, grilled cheese sandwich, orange juice, cream of tomato soup, mashed potato, chocolate layer cake. Recommended substitutions are plain pasta with gravy, turkey sandwich on white bread with leaf lettuce, mustard and mayonnaise, vegetable minestrone soup or chicken noodle soup, white rice or corn, apple juice or cranberry juice, and vanilla pudding or raspberry sherbet. It is essential for the nurses to understand the complexity of renal diet and steer their patients away from the food items that are high in sodium, potassium and phosphorus. Express menu ordering guide for renal diet (Appendix J) is developed with the restricted nutrients indicated next to each of the food item.

In conclusion, the kidneys have many vital functions in the body. Kidney dysfunction can lead to serious consequences such as chronic kidney disease and eventually end-stage renal disease. Nutritional management is a fundamental part of treatment for patients with kidney disease. Sodium, potassium, phosphorus, protein and fluids may be restricted based on the individual's kidney function and laboratory value. Renal diet restrictions can be overwhelming and confusing. Many renal patients require diet education to slow down the progression of kidney disease. Constant assessment, monitoring and counseling are also required for individuals with kidney disease.

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Modules 5 - Dysphagia Diet

The learning objectives of this module are to

- identify causes and symptoms of dysphagia
- recognize the different types of dysphagia diets
- understand liquid thickener available in Michigan Medicine
- distinguish compliant food items for each of the dysphagia diets
- describe the roles of multidisciplinary team members who provide care to patients with dysphagia

Dysphagia is defined as any disruption or difficulty in swallowing (1). In the US, dysphagia affects approximately 300,000-600,000 persons annually (1) and nearly 23% of patients reported symptoms of dysphagia in the primary care setting (2). Individuals with dysphagia show higher risk of malnutrition, aspiration pneumonia (1-3), dehydration and even death (2). In addition, decreased immune reaction, weaken respiratory drive and muscle strength, difficulty in recovery from illness and poor wound healing are commonly found in older individuals with malnutrition due to dysphagia (3). Aspiration pneumonia is frequently seen in the elderly who have swallowing problems because of bacterial colonization in the lungs from choking and aspirating (3).

Oropharyngeal dysphagia and esophageal dysphagia are the two major types of dysphagia. Patients can have either type of dysphagia or a combination of both (3). Oropharyngeal dysphagia is defined as the difficulty in safe transfer of a liquid or food bolus from the mouth to the esophagus (2). Stroke is the leading cause of oropharyngeal dysphagia (4). Other causes of oropharyngeal dysphagia are myasthenia gravis, Parkinson's disease, multiple sclerosis, Huntington's disease, upper esophageal sphincter (UES) dysfunction, muscular dystrophy, head and neck tumors, Zenker's diverticulum, cricopharyngeal achalasia, and osteophytes (2).

Swallowing is the main concern with esophageal dysphagia (4). Individuals with esophageal dysphagia have the sensation of food sticking in the base of the throat or in the chest for several seconds after swallowing (4). Esophageal dysphagia is caused by localized neuromuscular disorders or obstructive lesions (4). The structural causes of esophageal dysphagia include esophageal webs and rings, peptic and other strictures, esophageal malignancies, vascular compression and other extrinsic causes (3). The functional causes are

inflammatory disorders including erosive or eosinophilic esophagitis, achalasia, diffuse esophageal spasm, nutcracker esophagus, hypertensive lower esophageal sphincter, ineffective esophageal motility, and other rheumatologic disorders (3).

The signs and symptoms of dysphagia include eating meals more slowly, choking, coughing, or throat-clearing either during or after meals, and feeling as if food is stuck in the throat (3). Other symptoms include delayed or absence of swallowing initiation and regurgitation (5), frequent heartburn, pain while swallowing (odynophagia), drooling, being hoarse, and unexpectedly losing weight (4). If a patient is present with any sign and symptom of dysphagia, a barium swallow study (5) will usually be performed by a speech pathologist to evaluate swallowing ability.

A new global standardized dysphagia guideline was developed by the International Dysphagia Diet Standard Initiative (IDDSI) board. This group was founded in 2013 and consists of volunteers from various healthcare professions including nutrition and dietetics, medicine, speech pathology, occupational therapy, nursing, patient safety, engineering, food science and technology. The objective of IDDSI is to develop “*standardized terminology and definitions to describe texture modified foods and thickened liquids used for individuals with dysphagia of all ages, in all care settings, and all cultures.*” (6) The IDDSI board developed a new dysphagia diet framework (Figure 1) with eight levels of dysphagia diet and identifies them by numbers, text labels and color codes (6). Level 0 through 4 are used for beverages and level 3 through 7 are used for solid foods.

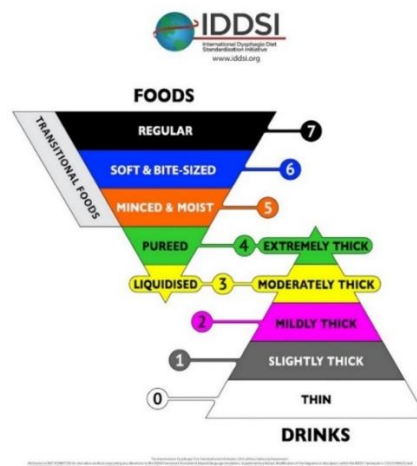


Figure 1 Dysphagia Diet Framework (6)

A gravity flow test using 10 mL slip tip hypodermic syringe is used to quantify flow of liquid (6) and classifies IDDSI levels from 0-3. (Figure 2). The flow test video can be found [here](#) (7). The characteristic of Level 0 or thin liquids are fast flow, flow like water, and can be drunk through any type of teat, cup or straw. Level 1 or slightly thick is thicker than water and requires a little more effort to drink than thin liquids. It is mostly used in the pediatric population for slower flow through a nipple. The flow test video for level 1 can be found [here](#). (8) Level 2 or mildly thick is sippable and flows off a spoon. The liquid should pour quickly from a spoon but slower than thin liquids. Patients on this level are required to drink through a standard bore straw (0.209 inch or 5.3 mm diameter). The flow test video for level 2 can be found [here](#). (9) Level 3 or liquidized moderately thick can be drunk from a cup. Patients on this diet are required to suck through a standard bore or wide bore straw (0.275 in or 6.9 mm). The liquid can be swallowed directly and cannot be piped, layered or molded on a plate. It can be eaten with a spoon but not a fork because it drips slowly in dollops through the prongs. The texture should be smooth with no lumps. The flow test video for level 3 can be found [here](#). (10)

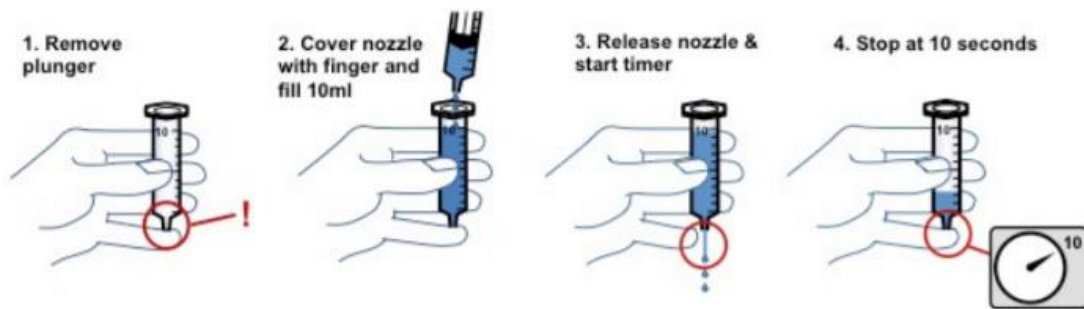


Figure 2 Step by step instruction to perform gravity flow test (6)

Sometimes patients with liquid restrictions prefer the flavor of thin liquids over the thickened liquids that are available in the market. SimplyThick is a thickening agent, which can be used to thicken a thin liquid to the consistency of dysphagia 2 and 3. It is available at Michigan Medicine through Material Services. Thin liquids that can be thickened include broth, juices, milk, coffee, tea and flavor water. Items that are not allowed to be thickened are frozen desserts such as popsicle, ice cream and milkshakes and cream soup such as cream of tomato soup. Some oral supplements can be thickened, and the information can be found at Appendix K. The instructions for using SimplyThick to thicken liquids to the appropriate IDDSI liquid consistencies are printed

on the back of the packet. Instructions include how many ounces of liquid to mix per packet of thickener and how long to stir the thickener into the liquid.

The IDDSI has recommended a fork pressure test, fork drip test, spoon tilt test, chopstick test and finger test to evaluate the textured modified solid food. Level 4 is defined as puree food or extremely thick liquid (previously known as spoon thick). Food on this level does not require chewing and cannot be drunk from a cup or sucked through a straw. It can be piped, layered or molded and holds its own shape. The small peaks must remain in the surface. Fork drip or spoon tilt tests (figure 3) are recommended to evaluate food on this level. The video for level 4 puree test can be found [here](#) (11) and the audit sheet can be found at Appendix L (13).

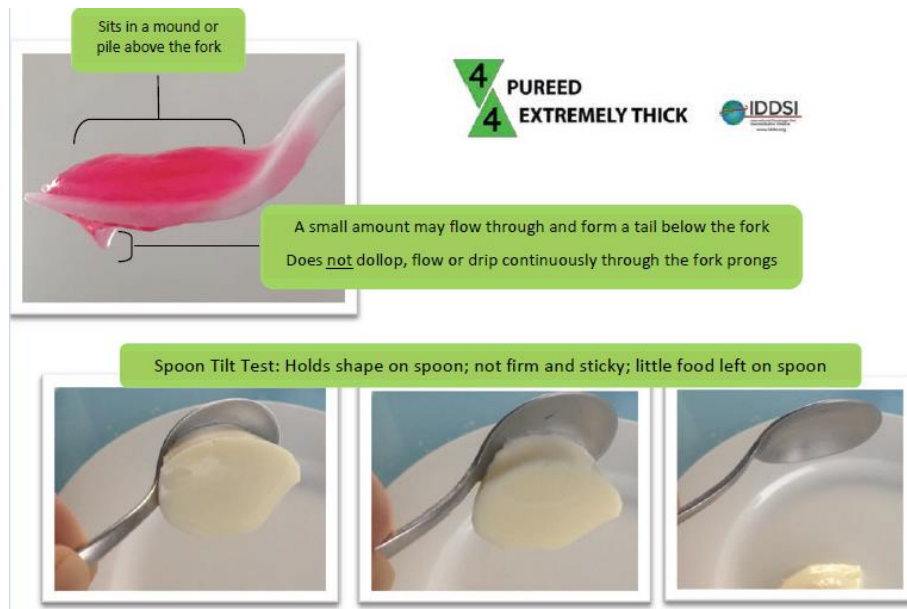


Figure 3 Spoon Tilt Test for Level 4 Puree and Extremely Thick (6)

Level 5 is defined as minced and moist. The food pieces that fit between tongs of a fork must be the size of 4mm by 4 mm (figure 4). The food should be able to be formed into a ball or lump on a plate. Fork pressure test, fork drip test, spoon tilt test, chopstick test, and finger test are used to evaluate the food consistency on this diet. The video of the level 5 tests can be found [here](#) (12) and the audit sheet can be found at Appendix L (13).

5 MINCED & MOIST 

Use slot between fork prongs (4mm) to determine whether minced pieces are the correct or incorrect size

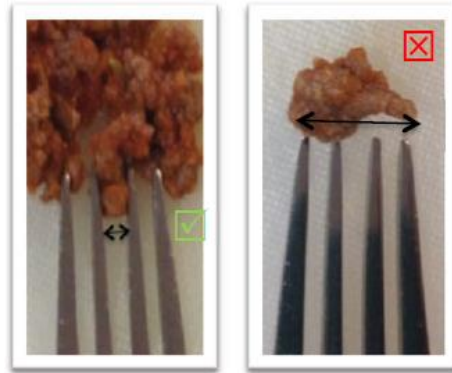


Figure 4 Fork test for Level 5 Minced and Moist diet (6)

Level 6 is defined as soft bite size. Foods on this level can be eaten and mashed down with a fork (figure 5), spoon or chopsticks. A knife is not required to cut the food and chewing is required before swallowing. Food should be soft, tender, and moist with no separate thin liquids. The food pieces should measure 15 mm by 15 mm for adults and 8mm by 8 mm for children. The audit sheet can be found at Appendix L (13).

6 SOFT & BITE-SIZED 

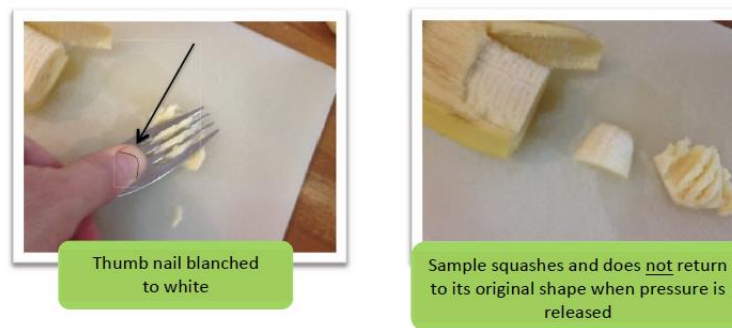


Figure 5 Fork test for Level 6 Soft and Bite-Sized (6)

In Michigan Medicine, speech pathologists are responsible to evaluate their patients' swallowing ability and recommend the appropriate level of dysphagia diet for liquid and solid food. Physicians then prescribe the patient an appropriate dysphagia diet based on the recommendations from their speech pathologist. Nurses are not allowed to overwrite food items

that do not meet the requirements of dysphagia diet to prevent patients from choking and aspiration. Nurses should assist patients to select food items that meet their diet guidelines to ensure their patient's safety. Nurses can contact speech pathologists of their patient if questions or concerns arise. On the other hand, nurses can overwrite thin liquids for patients who are on dysphagia 2 (mildly thick) and dysphagia 3 (moderately thick) when they verify that the unit has the SimplyThick thickening packet.

PFANS carries various items that are allowed for dysphagia diet. Patients can order mildly thick or moderately thick orange juice, apple juice, coffee and milk. Puree entrees include puree pancake, puree beef or chicken and vegetables including broccoli, carrots, corns and peas. Puree fruits include peaches, pears and pineapple. A few new entrees were developed for level 5 minced and moist. They are cod and potatoes, chicken noodles, savory beef and lentil stew. Macaroni and cheese, meatloaf, pasta with meat sauce, chicken fried rice, turkey tetrazzini and scramble eggs are available for Level 6 soft and bite-sized.

In conclusion, dysphagia is a swallowing disorder that can be caused by various medical conditions including stroke, tumors, muscle weakness, cancer, and neurological diseases. Some side effects of untreated dysphagia are pain while swallowing, heartburn, unintentional weight loss, and aspiration, which can lead to pneumonia. There are eight different dysphagia diets. Dysphagia level 0 to 3 are used for liquid consistency whereas dysphagia level 4 to 6 are used for solid consistency. It is extremely important to follow dysphagia diets to ensure a patient's safety.

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APPENDICES

APPENDIX A Michigan Medicine Express Menu



UH/CVC Room Service Express Menu

Grams of carbohydrate is listed as "g" next to the food items for your use.

Diet: General Consistent Carbohydrate (75G limit) Cardiac Low Sodium

Food Allergies: _____

Add Patient Name Label Here

Breakfast (Available 6:30 a.m. — 11:00 a.m.)

Breakfast Entrées

(Please limit entrée selections to 2 per order)

M Scrambled Eggs Regular or Eggbeaters[®]

Build Your Own Omelet

Regular or Eggbeaters[®]

Choose from:

M Diced Tomato (1g) **M** Diced Onion (1g)

M Green Peppers (1g) **M** Sliced Mushrooms (1g)

Diced Ham **M** Fresh Spinach (1g)

Ⓛ Cheddar Cheese (1g) **Ⓛ** Feta Cheese (1g)

Cinnamon French Toast (29g)

Pancakes (27g)

Sides

Turkey Bacon (1g) Two crispy slices

Bob Evans[®] Pork Sausage Links Two hearty links

Breakfast Potatoes (14g) Fresh, diced, Michigan potatoes with a touch of homefry seasoning

Thomas[®] English Muffin (25g)

Breakfast Pastries (Available 24 hours a day)

Fresh Barry's[®] Bagel (32g) Served with **Ⓛ**lite, strawberry, or chive and onion cream cheese

Banana Nut Muffin (29g)

Blueberry Muffin (30g)

Cereal (Available 24 hours a day)

Cheerios[®] (20g) Rice Chex[®] (24g)

Cream of Wheat (18g)

M Oatmeal (17g) Available with brown sugar (12g)

Available 24 Hours A Day

Snacks

Better Made[®] Homemade Potato Chips (24g)

Rold Gold[®] Pretzels (23g)

Smartfood[®] Popcorn (11g)

Fruit Nut Trail Mix Granola Bar (25g)

Ⓛ Harvest Cheddar[®] SunChips (19g)

Ⓛ String Cheese (1g)

Ⓛ Rice Krispies Treats[®] (17g)

Fruit and Yogurt

M Banana (28g)

M Grapes (20g)

M Apple (29g)

M Orange (26g)

M Mandarin Oranges (14g)

M Applesauce (13g)

M **Ⓛ** Prairie Farm[®] Locally made Lowfat Yogurt: Strawberry (33g), Blueberry (31g), Vanilla (32g)

Beverages

Apple Juice (9g)

Diet Pepsi[®]

Orange Juice (10g)

Sierra Mist[®] Zero

Cranberry Juice (10g)

Diet Vernors[®]

Coffee (Regular or Decaf)

Gingerale

M Lipton[®] Tea (Regular or Decaf)

M Bigelow's[®] Green Tea

Flavored Water:

M **Ⓛ** Skim Milk (11g)

- Strawberry Kiwi

Ⓛ 2% Milk (11g)

- Mango

Ⓛ Lowfat Chocolate Milk (26g) - Blue Raspberry

M Lactaid[®] Fat Free Milk (13g)

Silk[®] Vanilla Soy Milk (18g)

M Unsweetened Iced Tea

After Hours (Available 9:00 p.m. — 6:30 a.m.)

Made-to-Order Sandwiches

Selections (Prepared on White Bread):

M Roast Turkey (32g) **M** Roast Beef (32g)

M Tuna Salad (33g)

Choose from:

Ⓛ Sliced Swiss Cheese **M** Sliced Red Onions (2g)

Ⓛ Sliced Cheddar Cheese Mustard,

Ⓛ Sliced American Cheese (1g) **M** Ketchup (2g)

M Leaf Lettuce (1g) **M** Hellman's[®] Light Mayo

M Sliced Tomatoes (2g) Pickle Slices

Entrée and Soup

Ⓛ Home-Style Macaroni and Cheese (27g)

Chicken Noodle Soup (7g)

Condiments (Available 24 hours a day)

Sugar (3g)

Salt

Splenda[®]

Pepper

Brown Sugar (12g)

Mrs. Dash[®]

Creamer (1g)

Margarine

Tartar Sauce (3g)

Fresh Lemon Wedge (2g)

BBQ Sauce Packet (5g)

Whole Berry Cranberry Sauce (17g)

Regular Syrup (29g)

Sugar Free Syrup (4g)

Ⓛ Cream Cheese: Lite (1g), Strawberry (4g), Chive and Onion (2g)

M healthy Identifies healthier items. For more information, visit www.mhealthy.umich.edu

Ⓛ Contain Lactose

Please Remember to Request Condiments When Ordering

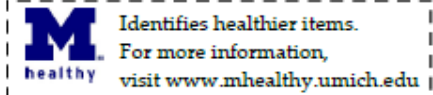
Last Update: October 2018



UH/CVC Room Service Express Menu

Grams of carbohydrate is listed as "g" next to the food items for your use.

Lunch and Dinner (Available 11:00 a.m. to 9:00 p.m.)



Note: "Entrées", "Grilled Items", "Made-to-Order Sandwiches" and "Featured Deli Plates" are each considered one entrée. Please limit entrée selections to 2 per order.

Please limit guest selections to 1 entrée, 3 additional items, and 2 beverages.

Hot Entrée Selections

- 🍴🥗 Potato Encrusted Cod (7g) Available with tartar sauce and a fresh lemon wedge
- 🍴 Tender Chicken Breast Served plain or with BBQ sauce (5g) on the side
- Roast Turkey Available with chicken gravy and whole berry cranberry sauce
- Pot Roast (9g) Braised beef brisket sliced and served with a gravy abundant with red skin potatoes, parsnips, carrots, onion and celery
- Chargrilled Salmon (2g) Seasoned with a light pineapple soy marinade
- 🍴🥗 Home-Style Macaroni and Cheese (27g)
- Homemade Meatloaf (13g) Served with brown gravy (4g) or marinara sauce (3g)

Grilled Items

- Gardenburger® Malibu Burger (Vegan) (49g) Prepared with organic whole grains, corn and carrots, and served on a multigrain bun
- Hamburger (28g) Served on a multigrain bun
- 🍴🥗 Grilled Cheese Sandwich (42g) Swiss and American Cheese, lightly grilled on Texas toast, available with Sliced Turkey Breast

Featured Deli Entrées

- 🍴🥗 Chicken Caesar Wrap (23g) Chicken breast, romaine lettuce, parmesan cheese, and dressing wrapped in flat bread
- 🍴🥗 Michigan Chicken Cherry Salad (23g) Mixed green topped with tender chicken breast, toasted almonds, dried cherries, shredded carrots, blue cheese crumbles, and your choice of dressing

Made-to-Order Sandwiches

Selections (Prepared on White Bread):

- 🍴 Roast Turkey (32g) 🍴 Roast Beef (32g) 🍴 Tuna Salad (33g)
- Choose from: 🍴 Sliced Swiss Cheese 🍴 Sliced Red Onions (2g)
- 🍴 Sliced Cheddar Cheese 🍴 Mustard
- 🍴 Sliced American Cheese (1g) 🍴 Ketchup (2g)
- 🍴 Leaf Lettuce (1g) 🍴 Hellman's® Light Mayonnaise
- 🍴 Sliced Tomatoes (2g) 🍴 Pickle Slices

Sides

- 🍴 Corn (19g)
- 🍴 Broccoli (4g)
- 🍴🥗 Mashed Potatoes (21g)
- 🍴🥗 Chicken Gravy (2g)
- Baked Potato (41g)
- 🍴🥗 Sour Cream (2g)
- 🍴 Garlic Green Beans (6g)

Soup and Bread Selections

- 🍴 Chicken Noodle Soup (7g)
- 🍴 Cream of Tomato Soup (17g)
- 🍴 Chili Con Carne (21g)
- Chicken Consommé (1g)
- 🍴 Vegetable Minestrone Soup (15g)
- Wheat Dinner Roll (18g)

Side Salads

- 🍴 Tossed Mixed Greens (4g) Mixed greens served with cucumber and tomato garnish; available with your choice of dressing upon request
- 🍴 Cottage Cheese (3g)

Salad Dressings (Our Signature dressings are homemade and low in fat)

- Signature Balsamic Vinaigrette (5g)
- 🍴🥗 Signature Ranch (3g)

Desserts (Please limit dessert selections to 2 per order)

- 🍴 Apple Crisp (33g)
- Orange Jello (17g)
- 🍴 Chocolate Pudding (22g)
- 🍴 Chocolate Chip Cookies (17g)
- 🍴 Vanilla Ice Cream Cup (16g)
- Lemon Ice (20g)
- 🍴 Milkshakes: Chocolate (29g), Strawberry (30g), Vanilla (31g), Cappuccino (30g)
- 🍴 Seasonal Cheesecake (25g)
- 🍴 Orange Sherbet (26g)
- 🍴 Vanilla Pudding (20g)
- 🍴 Chocolate Layer Cake w/choc Icing (31g)

OUR PROMISE

To graciously serve healthy, freshly prepared meals within 60 minutes of your order.

🍴🥗 Contain Lactose

Please Remember to Request Condiments When Ordering

Last Update: October 2018

APPENDIX B Summary of Vitamins and their Functions, Deficiency and Sources

Vitamin	Functions	Deficiency Disease	Sources
A	<ul style="list-style-type: none"> • Dim light vision • Differentiation of epithelial cells 	Night Blindness Xerophthalmia	Liver, Egg yolk, Fortified milk, Fish, deep yellow (sweet potatoes, squash, apricots, cantaloupe), dark green leafy (spinach, collards, broccoli, cabbage)
D	<ul style="list-style-type: none"> • Increases intestinal absorption of calcium • Stimulates bone production • Decreases urinary excretion of calcium 	Rickets Osteomalacia	Sunlight on skin, fortified milk, cod liver oil, salmon, herring, tuna, eggs, liver, fortified cereals
E	<ul style="list-style-type: none"> • Antioxidant • Protects polyunsaturated fatty acids in red blood cell membranes from oxidation in lungs 	No specific term	Sunflower, safflower, and canola oils Nuts (Almond, hazelnuts, and peanuts) Broccoli, cooked spinach Fortified cereals
K	<ul style="list-style-type: none"> • Used in synthesis of several clotting factors, including prothrombin • Assists vitamin D to synthesize a regulatory bone protein 	No specific term	Collard, spinach, Brussels sprouts, Cabbage Broccoli Canola and soybean oils Synthesis in intestine
C Ascorbic Acid	<ul style="list-style-type: none"> • Formation of collagen • Antioxidant • Facilitation of iron absorption 	Scurvy	Citrus fruit and juice Broccoli Brussel Sprouts Green and red peppers Cantaloupe, Strawberries Kiwi fruit, Papaya
B ₁ Thiamin	<ul style="list-style-type: none"> • Coenzyme in carbohydrate and amino acid metabolism 	Beriberi	Pork, Beef liver, Salmon Black beans, Wheat germ Fortified cereals
B ₂ Riboflavin	<ul style="list-style-type: none"> • Coenzyme in protein metabolism; need increases as protein needs increase 	Ariboflavinosis	Milk and dairy products Eggs Meats, especially liver Fortified cereals
B ₃ Niacin	<ul style="list-style-type: none"> • Coenzyme in energy production • Participate in synthesis of fatty acids and steroid hormones 	Pellagra	Liver Fish, Tuna Meat Poultry Whole, enriched, or fortified grains Coffee, Tea

Vitamin	Functions	Deficiency Disease	Sources
B ₆ Pyridoxine	<ul style="list-style-type: none"> • Coenzyme in metabolism of amino acids 	No specific term	Sirloin steak, Salmon Chicken breast Whole grains Fortified cereals Bananas Nuts, Broccoli, Carrots
Folate Folic Acid	<ul style="list-style-type: none"> • Essential to the formation of DNA • Participant in formation of heme 	No specific term	Liver Dried peas, beans, lentils Wheat germ Peanuts Dark green leafy (asparagus, endive, lettuce, Brussels sprouts, broccoli, spinach) Fortified grain products Whole grains
B ₁₂ Cobalamin	<ul style="list-style-type: none"> • Synthesis of DNA, RNA, metabolism of amino and fatty acids • Synthesis and maintenance of myelin 	Pemicious anemia (lack of intrinsic factor, not dietary) Vitamin B ₁₂ deficiency (avoidance of animal products)	Meat, Fish, Poultry, Eggs Milk, Cheese Fortified soymilk, tofu
Pantothenic Acid	<ul style="list-style-type: none"> • Coenzyme in fatty acid metabolism • Many other metabolic and regulatory processes 	No specific term	Liver, Chicken, Egg yolk Yogurt, Legumes, Potatoes Mushroom, Broccoli Whole grain cereals
Biotin	<ul style="list-style-type: none"> • Coenzyme is the synthesis of fat, glycogen, and amino acids 	No specific term	Liver, Eggs, Salmon Milk, Soybeans, Peanuts Sweet potato
Choline	<ul style="list-style-type: none"> • Liver and brain function • Lipid metabolism • Cell membrane structure 	No specific term	Liver, Eggs, Beef, Pork Milk, Yogurt Baked beans, Broccoli Wheat germ

APPENDIX C Summary of Minerals and their Functions, Sign and Symptoms of Deficiency and Excess and Sources

Mineral	Functions	Signs and Symptoms of Deficiency	Sign and Symptoms of Excess	Sources
Calcium	<ul style="list-style-type: none"> • Structure of bones and teeth • Nerve conduction • Muscle contraction • Blood clotting 	Tetany Osteoporosis Rickets (premature infants)	Calcification of soft tissue	Milk products, salmon, sardines with bones, clams, oysters
Phosphorus	<ul style="list-style-type: none"> • Structure of bones and teeth • Component of DNA and RNA • Component of buffers and almost all enzymes • Component of ADP and ATP 	Increased calcium excretion Bone loss Muscle weakness	Tetany Convulsions Renal insufficiency	Lean meat, fish, poultry, milk, nuts, legumes
Sodium	<ul style="list-style-type: none"> • Fluid balance • Transmission of electrochemical impulses along nerve and muscle membranes 	Hyponatremia	Hypernatremia	Table salt, processed foods, milk and milk products
Potassium	<ul style="list-style-type: none"> • Conduction of nerve impulses • Muscle contraction 	Hypokalemia (not usually dietary)	Hyperkalemia (not usually dietary)	Banana, cantaloupe, winter squash, green leafy vegetables, legumes, salt substitutes
Magnesium	<ul style="list-style-type: none"> • Associated with ADP and ATP • Involved in DNA and protein synthesis • Influences cardiac and smooth muscle contractility 	Inpaired CNS function Tetany	Weakness Depressed respirations Cardiac arrest	Green leafy vegetables, seafood, peanut butter, legumes, coffee, cocoa
Sulfur	<ul style="list-style-type: none"> • Component of amino acids methionine and cysteine • Gives shape to hair, skin, and nails 	None known due solely to sulfur	None known due solely to sulfur	Complete protein foods
Chloride	<ul style="list-style-type: none"> • Component of hydrochloric acid • Helps maintain fluid and acid base balance 	In infants: neurological impairments	None known	Table salt, salty snacks, processed foods, eggs, meats, seafood
Iron	<ul style="list-style-type: none"> • Component of hemoglobin 	Fatigue, lightheadedness Short of breath Hypochromic, microcytic anemia	Hemosiderosis Hemochromatosis	Liver, other red meats, clams, oysters, lima and navy beans, dark green leafy cooked vegetables, dried fruit
Iodine	<ul style="list-style-type: none"> • Component of thyroid hormones 	Goiter Cretinism Myxedema	Acnelike lesions Goiter	Iodized salt Saltwater seafood

Mineral	• Functions	Signs and Symptoms of Deficiency	Sign and Symptoms of Excess	Sources
Fluoride	<ul style="list-style-type: none"> • Hardens teeth 	Dental caries	Mottled teeth Increased caries	Fluoridated water, seafood, brewed tea
Zinc	<ul style="list-style-type: none"> • Component of 70 enzymes • Involved in DNA and RNA synthesis • Necessary for collagen formation 	Growth failure Hypogonadism Delayed wound healing Impaired night vision Impaired taste Delayed sexual maturation	Copper deficiency Suppressed immune response	Red meat, especially organ meat Seafood, especially oysters Poultry, pork, dairy products, whole grains
Copper	<ul style="list-style-type: none"> • Cofactor for enzymes involved in hemoglobin synthesis and cell respiration • Necessary for melanin formation 	Menkes disease Anemia Demineralization of skeleton Depigmentation of skin and hair Impaired immune function	Wilson disease Copper deposits in liver, kidneys, brain, spleen, and cornea	Organ meats, shellfish, nuts, seeds, legumes, dried fruit
Selenium	<ul style="list-style-type: none"> • Part of many enzymes • Necessary for iodine metabolism • Protects against the toxicity from mercury, cadmium and silver 	Keshan cardiomyopathy	Sour milk or garlic breath odor Fatigue Nail and hair loss	Brazil nuts, meats, seafood, dairy products, eggs
Chromium	<ul style="list-style-type: none"> • Thought to potentiate action of insulin 	Weight loss Impaired glucose utilization Elevated blood lipids Peripheral neuropathy	Rarely related to food Metallic taste	Meats, especially organ meats, fish, poultry, cheese, peanuts, whole grains
Manganese	<ul style="list-style-type: none"> • Involved in amino acid and carbohydrate metabolism • Required for bone formation 	Dermatitis Decreased growth of hairs and nails Skeletal defects Changes in hair and beard color	Accumulated minerals in brain In miners: liver damage and Parkinson-like syndrome Central nervous system impairment	Whole grains, dried fruits, nuts, cooked green, leafy vegetables
Cobalt	<ul style="list-style-type: none"> • Component of vitamin B12 	Not reported		Meat, poultry, fish, egg, milk, cheese
Molybdenum	<ul style="list-style-type: none"> • Cofactor for enzymes involved in catabolism of sulfur-containing amino acids and purines 	Parenteral nutrition clients only: tachycardia, headache, mental disturbances, coma	Hyperuricemia Gout	Meat, fish, poultry, legumes, whole grains

APPENDIX D Example Meal Plan for a Consistent Carbohydrate Diet

Meal	Food Item	Beverages/Condiments
Breakfast	Scrambled Eggs: 0 g CHO Turkey Bacon: 1 g CHO Breakfast Potatoes: 14 g CHO Applesauce: 15 g CHO Banana Nut Muffin: 29 g CHO	Ketchup: 2 g CHO Coffee: 0 g CHO
90 grams	Add Blueberry Yogurt: 31 g CHO	
Lunch	Whole Wheat Turkey Sandwich w/Swiss Cheese, leaf lettuce, sliced tomato, and sliced red onions: 37 g CHO Chicken Noodle Soup: 7 g CHO Mandarin Oranges: 14 g CHO	Mayonnaise: 1 g CHO Sprite Zero: 0 g CHO
90 grams	Add Granola Bar: 25 g CHO	
Dinner	Tender Chicken Breast: 0 g CHO Mac and Cheese: 27g CHO Broccoli: 4 g CHO Chocolate Chip Cookie: 17 g CHO	Skim Milk: 11g CHO
90 grams	Add Vegetable Minestrone Soup 15g CHO Add Wheat Dinner Roll 18g CHO	Margarine: 0 g CHO

APPENDIX E Express Menu Ordering Guide for Cardiac diet

Cardiac diet (3g sodium and 20g saturated fat/day)




















Items that are high in saturated fat and sodium		Suggestions/Substitution
Breakfast	Omelet Topping - Cheddar Cheese	Feta Cheese, other toppings such as diced tomato, diced onion, sliced mushroom, diced green peppers, fresh spinach
	Sausage Links	Turkey Bacon
Snacks	Potato chip String Cheese	Granola bar, rice krispies treat, popcorn
Condiments	Salt Packet	Mrs. Dash
Hot Entree	Mac and Cheese	Potato cod, roasted turkey, tender chicken breast
	Grilled Cheese Sandwich	Make to order sandwich Chicken Caesar wrap w/vegetable salad
Sandwich Condiments	Cheddar Cheese American Cheese Swiss Cheese	Lettuce, tomato, sliced onions, ketchup, light mayo, mustard
Desserts	Chocolate Layer Cake Apple Crisp Seasonal Cheesecake Ice cream (both chocolate and vanilla)	Chocolate Chip Cookie, sherbet (Raspberry or Orange), lemon ice, Jell-O

Select no more than 1 item listed below at each order:

- Banana nut muffin
- 2% milk
- Chocolate chip cookie
- Milkshakes (vanilla, chocolate, strawberry, cappuccino)
- Ice cream (vanilla, chocolate)

APPENDIX F Pictorial Handout of High Sodium Foods

HIGH SODIUM FOODS

Snack Foods	Meats & Proteins	Other
 Salted Potato Chips	 Salted Pretzels	 Hot Dogs
 Salted Popcorn	 Bacon	 Pizza
 Salted Nuts	 Sausage Links/Patties	 Instant Hot & Ready-to-Eat Cereal
 Salted Crackers	 Canned Meats	 Processed Cheese & Cheese Spreads
	 Deli Meats	 Canned Soups & Vegetables
		 Frozen Entrées
		 Dining Out
		 Pickles & Relishes
		 Olives
		 Salt
		 Sauces: BBQ, Teriyaki, Tartar, Soy, Spaghetti Sauce, Broths & Bouillon

Finding Sodium Content on a Food Label

Read ingredient labels — some lower sodium foods contain potassium chloride as a substitute for salt. These should be avoided.

Nutrition Facts	
Serving Size 5 oz (140g)	
Servings Per Container about 6	
Amount Per Serving	
Calories 290	Calories from Fat 180
% Daily Value*	
Total Fat 20g	31%
Saturated Fat 7g	36%
Cholesterol 65mg	20%
Sodium 780mg	32%
Total Carbohydrate 30g	10%
Sugars 28g	
Protein 15g	
Vitamin C 10%	Iron 4%
<small>Not a significant source of dietary fiber, vitamin A, and calcium.</small>	
<small>* Percent Daily Values are based on a diet of other people's secrets.</small>	

Serving Size:
Always look here first. Make sure you know how much you are getting in your serving size.

Sodium:
Always look for the "mg" and *not* the "%".

APPENDIX G Pictorial Handout for Fluid Restrictions

BEVERAGES AND FLUIDS

Recommended _____ cups each day.

 Milk	 Water	 Juice	 Kool-aid	 Ice	
 Coffee	 Tea	 Alcohol (with doctor's permission)	 Pop / Soda		
 Popsicle	 Ice Cream & Sherbet	 Jello	 Soups	 Gravy	
































- Any food that is liquid at room temperature counts as fluid. If it melts or pours at room temperature it is a fluid.
- Measure all fluids with a standard measuring cup and keep track of your fluids each time you eat or drink them.
- Fill a bottle with _____ ounces of fluid. Each time you consume a fluid, remove an amount equal to it from the bottle.
- Limiting salty foods will help control thirst.

COMMON MEASUREMENTS

One cup = 8 ounces
One pint = 2 cups
One quart = 4 cups
One and one-half quarts = 6 cups



























APPENDIX H Pictorial Handout of Acceptable and High Potassium Foods

ACCEPTABLE POTASSIUM FOODS

Fruits			Vegetables		
<i>Serving size: ½ cup fresh or canned or 1 small piece</i>			<i>Serving size: ½ cup cooked or 1 cup raw</i>		
 Berries	 Apples	 Cherries	 Cauliflower	 Asparagus	 Eggplant
 Peaches	 Pineapple	 Grapes	 Lettuce	 Celery	 Cucumbers
 Watermelon	 Lemons & Limes	 Tangerines	 Carrots	 Onions	 Radishes
 Plums	 Pears	 Canned Fruit	 Green Beans	 Cabbage	 Peppers
 Mandarin Oranges	 Applesauce	 Juices: Apple, Grape, Peach Nectar, Pear, Pineapple, Cranberry	 Peas	 Corn	 Turnips
			 Okra		



HIGH POTASSIUM FOODS

Fruits	Vegetables	Other
<i>Serving size: ½ cup fresh or canned or 1 small piece 1/4c dried fruit</i>	<i>Serving size: ½ cup cooked or 1 cup raw</i>	
 Oranges & Orange Juice	 Greens (Beet / Spinach)	 Chocolate
 Bananas	 White & Sweet Potatoes	 Nuts & Seeds
 Kiwi	 Tomatoes & Tomato Juice	 Milk & Soy Milk
 Mango	 Artichoke	 Yogurt
 Cantaloupe	 Avocado	 Raisin Bran
 Nectarines	 Broccoli	 French Fries & Potato Chips
 Dried Fruits	 Squash Winter & Summer	 Pumpkin
 Raisins	 Bok Choy	 Salt Substitute
 Pomegranate		 Coconut Water & Coconut Milk



APPENDIX I Pictorial Handout of Acceptable and High Phosphorus Foods

ACCEPTABLE PHOSPHORUS FOODS

Grains, Cereals and Pasta



Rice Bread Crackers Cereal

Flour Tortillas Pasta Muffin

Milk Substitutes



Rice Milk Almond Milk

Dairy / Protein



Butter Cream Cheese Sour Cream

Fruits and Vegetables



Snacks and Sweets



Unsalted Popcorn Unsalted Pretzels Angel Food Cake Vanilla Wafers

Rice Krispy Treats Graham Crackers Sugar Cookies Vanilla Sandwich Cookies

Frozen Fruit Pop Sherbet Hard Candy Jelly Beans

Beverages




Clear Color Soda - Ginger Ale Lemonade Water Tea



HIGH PHOSPHORUS FOODS

Dairy & Proteins



Milk (incl. Condensed & Evaporated) Milkshakes & Malts Non-dairy Creamers Yogurt

Pudding Alfredo Sauce Processed Cheese Macaroni & Cheese


Hot Dogs / Sausage Chicken Nuggets Deli Meats Dates Dried Beans & Peas

Phosphorous is added to food for flavor, color, and as a preservative. Phosphorous is often not on the Nutrition Facts panel. Foods with added phosphorous are more harmful than foods with natural phosphorous. Look on the Ingredient List of the food label to find out if a food has added phosphorous. If you find words that contain "phos" such as calcium phosphate, phosphoric acid, then the item contains added phosphorous. **Limit foods with "phos" as an ingredient.**

Nutrition Facts	
Serving Size 1/2 cup (125g)	
Amount Per Serving	
Total Fat	10g 20%
Total Carb	25g 50%
Total Protein	5g 10%
Total Phosphorus	100mg 20%
Total Sodium	50mg 10%
Total Sugar	10g 20%
Total Fat	10g 20%
Total Carb	25g 50%
Total Protein	5g 10%
Total Phosphorus	100mg 20%
Total Sodium	50mg 10%
Total Sugar	10g 20%

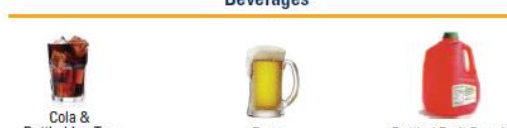
*Percent Daily Values are based on a diet of other people's secrets.

Breads & Cereals




Bran Muffin Bran Cereal Pancakes & Waffles (Mixes / Frozen)

Beverages



Cola & Bottled Ice Tea Beer Bottled Fruit Punch

Snacks



Chocolate & Caramels Pizza Nuts, Peanut Butter & Seeds

Cheesy Snacks Ice Cream Bars & Fudgesicles Pastries & Donuts



APPENDIX J Express Menu Ordering Guide for Renal diet

Renal (low phosphorus, low potassium and low sodium)

- Items high in phosphorus – dairy (milk, and cheese), whole wheat products and dark pops.
- Items high in potassium – orange, banana, tomato, potatoes, milk
- Items high in sodium – processed meat and dairy (cheese)

Items that are High in Phosphorus (P), Potassium (K) or Sodium (Na)		Suggestions/Substitution
Breakfast	Omelet Topping - Cheddar Cheese (P, Na) and Diced Tomato (K)	Feta Cheese, other toppings such as diced onion, sliced mushroom, diced green peppers, fresh spinach
	Pancakes (P)	French Toast
	Breakfast Potato (K)	Sausage link, turkey bacon, English muffin
Snacks	Potato Chip (K, Na) Sun Chip (Na) String Cheese (P, Na)	Granola bar, rice krispies treat, popcorn
Fruit	Banana (K) Orange (K)	Grape, apple, mandarin oranges, applesauce
Beverage	Orange Juice (K)	Apple Juice, Cranberry Juice
	Chocolate milk (P, K)	Half serving of white milk
	Diet Pepsi (P)	Diet Sprite, Diet Gingerale
Condiments	Salt (Na)	Mrs. Dash
Hot Entrée	Mac and Cheese (P, Na)	Potato cod, roasted turkey, tender chicken breast
	Grilled Cheese Sandwich (P, Na)	Make to order sandwich
Deli Entrée	Michigan Chicken Cherry Salad (blue cheese is high in P and Na)	Specify no blue cheese on the special instruction
Sandwich Condiments	Cheddar Cheese (P, Na) American Cheese (P, Na) Swiss Cheese (P, Na)	Lettuce, tomato, sliced onions, ketchup, light mayo, mustard
Soup	Cream Tomato Soup (K, P) Chili Con Carne (K, P)	Chicken Noodle Soup, Vegetable Minestrone
Sides	Baked Potato (K) Mashed Potato (K)	Corn, Garlic Green Beans, Broccoli
Desserts	Chocolate Layer Cake (P) Ice cream (both chocolate and vanilla) (P) Milkshakes (vanilla, chocolate, strawberry, cappuccino) (P) Chocolate Pudding (P)	Chocolate Chip Cookie, Seasonal Cheesecake Sherbet (Raspberry or Orange), Jell-O Vanilla Pudding

If a Renal patient order milk, they will automatically receive 4-ounce, instead of 8-ounce.



New, improved and easy to mix with a spoon!
Simply Different, Simply Better.®

SUPPLEMENT MIXING GUIDE

Supplements can usually be thickened with SimplyThick® EasyMix™ with some slight modification to the standard procedures. Supplements are difficult environments for thickeners.

Supplements fall into 3 categories:

- A** Supplements that use SimplyThick EasyMix **without modification.**
- B** Supplements that use SimplyThick EasyMix **with modification.**
- C** Supplements that are **not compatible** with SimplyThick EasyMix.

We recommend these general guidelines for thickening supplements:

1. Stir SimplyThick EasyMix in supplements for **1 full minute.**
2. Supplements thickened with SimplyThick EasyMix should be consumed within **4 hours of preparation.**

The supplements listed on this sheet are the ones we have tested to date. The most up to date information can be found at: www.simplythick.com/supplements

B Supplements That Use SimplyThick EasyMix WITH MODIFICATION

- | | |
|--------------------------------|-------------------------|
| Atkins Protein Rich Shake | Ensure Enlive |
| Boost Glucose Control | Ensure High Protein |
| Boost Optimum | Ensure Plus |
| Boost Very High Calorie | Enterex Diabetic |
| Carnation Breakfast Essentials | Nepro |
| Ensure Compact | Nestle Fiber Source 1.2 |
| | Peptamen Junior |

Supplements listed to the left use SimplyThick EasyMix at HALF of our standard use rates. 1 packet or 1 pump stroke will effectively thicken 8 oz. of these supplements. The table below is for 8 oz. of the supplement.

SUPPLEMENTS ABOVE USE SIMPLYTHICK EASYMIX WITH MODIFICATION

Per 8 oz.*	Nectar (Level 2 Mildly Thick)	Honey (Level 3 Moderately Thick)	Pudding (Level 4 Extremely Thick)
Pump Strokes (6g/stroke)	1	2	4
Nectar Packet (Level 2 Mildly Thick) (6g)	1	2	4
Honey Packet (Level 3 Moderately Thick) (12g)	N/A	1	2

*Note: Most supplements come in 8 oz. containers. This table shows the use rate for thickening the full container.

C SUPPLEMENTS THAT ARE NOT COMPATIBLE with SimplyThick EasyMix.

The following supplements are not recommended for use with SimplyThick EasyMix:

- Boost Breeze — All Flavors
- Ensure Clear — All Flavors
- Hormel Solutions 206 — All Flavors
- Isopure — All Flavors
- KetoCal 3:1 — 3:1 ratio ketogenic formula (20kcal/fl oz 0.66 Kcal/mL)
- Nutren — All Flavors
- Optisource — All Flavors

Questions? Email us at: info@simplythick.com · Visit us at: www.simplythick.com

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Home Office: (888)721-2023 — 8:30-4:30 Central, M-F
Fax: (800)508-2990



Scan to view mixing video

DISCLAIMER – Although information provided is believed to be true and accurate, SimplyThick, LLC (ST) cannot anticipate all actual situations and/or conditions of use. ST cannot assure the suitability of SimplyThick® for any particular situation or that SimplyThick® will work in every situation. If you have any questions about use of SimplyThick®, consult your doctor or physician. See www.simplythick.com/safety for more information.

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Pub 17–Supplement Mixing: 09/2018

A Supplements That Use SimplyThick EasyMix WITHOUT MODIFICATION

- | | | | |
|---|---|-----------------------|--|
| Boost High Protein Complete Nutritional Drink | Carnation Breakfast Essentials – High Protein | Ensure Original | PediaSure |
| Boost Kid Essentials | Carnation Breakfast Essentials – Powder | Evolve Classic | PediaSure SideKicks |
| Boost Kid Essentials 1.5 Fiber | Enfagrow Toddler Next Steps | Glucerna | Premier Protein |
| Boost Simply Complete | Ensure Light | Glucerna Hunger Smart | ProNurish Low Fodmap Nutritional Drink |
| | Ensure Max Protein | Muscle Milk | SlimFast Original |
| | | Nestle IsoSource 1.5 | Suplena |
| | | PediaSmart | |

SUPPLEMENTS ABOVE USE SIMPLYTHICK EASYMIX WITHOUT MODIFICATION

Per 8 oz.*	Nectar (Level 2 Mildly Thick)	Honey (Level 3 Moderately Thick)	Pudding (Level 4 Extremely Thick)
Pump Strokes (6g/stroke)	2	4	8
Nectar Packet (Level 2 Mildly Thick) (6g)	2	4	8
Honey Packet (Level 3 Moderately Thick) (12g)	N/A	2	4

*Note: Most supplements come in 8 oz. containers. This table shows the use rate for thickening the full container.

APPENDIX L Audit Sheet for Dysphagia 4, 5 and 6

Intended for **4** EXTREMELY THICK



Product or food tested			
If soup, heating method(s)			
Temperature when tested at:	<input type="checkbox"/> optimal serving temperature	<input type="checkbox"/> 15 mins after serving	<input type="checkbox"/> 30 mins after serving

- Instructions:**
- Level 4 Extremely Thick **critical** tests include **Appearance + Fork Drip Test + Spoon Tilt Test** OR if these are not available Finger Test. Chopstick test not appropriate.
 - The food item must pass or meet criteria for any row marked *.

	Meets criteria at		
	Time of service	15 mins after serving	30 mins after serving
Critical: Appearance			
* No lumps	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Critical: Fork Drip Test (metal dinner fork needed)			
* Food sits in a mound above the dinner fork (a small amount may form a tail below the dinner fork)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
* Does not drip or flow continuously through the dinner fork	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Critical: Spoon Tilt Test (teaspoon needed)			
* Holds shape on teaspoon	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
* Food slides off spoon with little food left on teaspoon (i.e. not sticky) May spread or slump slowly on a flat plate	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Alternative if Fork or Spoon not available: Finger Test			
* Hold a sample on fingers without it dripping through continuously	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
* Food slides smoothly and easily between fingers Food leaves noticeable residue on fingers	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Preferred but not critical: Fork Pressure Test			
Prongs of fork make clear pattern on surface OR food briefly retains dinner fork indentation marks	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
OVERALL CONCLUSION: Does the sample meet the criteria for Level 4 Extremely Thick?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No

- Notes:** * Extremely Thick liquids need to be able to be put in the mouth and swallowed whole. No chewing and no bolus formation skills should be needed to eat this consistency.
- * Please see also <http://iddsi.org/framework/food-testing-methods/>

Testing intended for **5** MINCED & MOIST



Product or food tested			
Heating method(s)			
Temperature when tested:	<input type="checkbox"/> at time of service	<input type="checkbox"/> 15 mins after serving	<input type="checkbox"/> 30 mins after serving

- Instructions:**
- Level 5 Mincéd & Moist **critical** tests include **Appearance + Fork Pressure Test + Spoon Tilt Test** OR if these are not available Finger Test.
 - For particle size: food intended to mimic a 'chewed bolus' – must be equal to or less than 4mm width and no longer than 15mm in length (adults); Equal to or less than 2mm width and no longer than 8mm length (pediatrics).
 - The food item must pass or meet criteria for any row marked *.

	Meets criteria at		
	Time of service	15 mins after serving	30 mins after serving
Critical: Appearance			
* Lumps less than or equal to 4mm (adults); 2mm (pediatrics)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
* No separate thin liquid	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Critical: Fork Pressure Test (metal dinner fork needed)			
* Food can be easily mashed with little pressure from a dinner fork [pressure should not make thumb nail blanch to white]	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
* Easily separates and comes through prongs of a dinner fork	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Critical: Spoon Tilt Test (teaspoon needed)			
* Holds shape on teaspoon	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
* Food slides off spoon with little food left on teaspoon (i.e. not sticky) May spread or slump slowly on a flat plate	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Alternative if Fork or Spoon not available: Finger Test			
* Small soft smooth rounded particles can be easily squashed between fingers	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
* Food feels moist and will leave fingers wet	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Optional: Chopstick Test			
Chopsticks can scoop or hold this texture if food is moist and cohesive	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
OVERALL CONCLUSION: Does the sample meet the criteria for Level 5 Mincéd & Moist?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No

- Notes:** * Minimal chewing should be needed to eat this food texture (e.g. tongue force should be able to squash/break food).
- * Please see also <http://iddsi.org/framework/food-testing-methods/>

Testing intended for **6** SOFT & BITE-SIZED



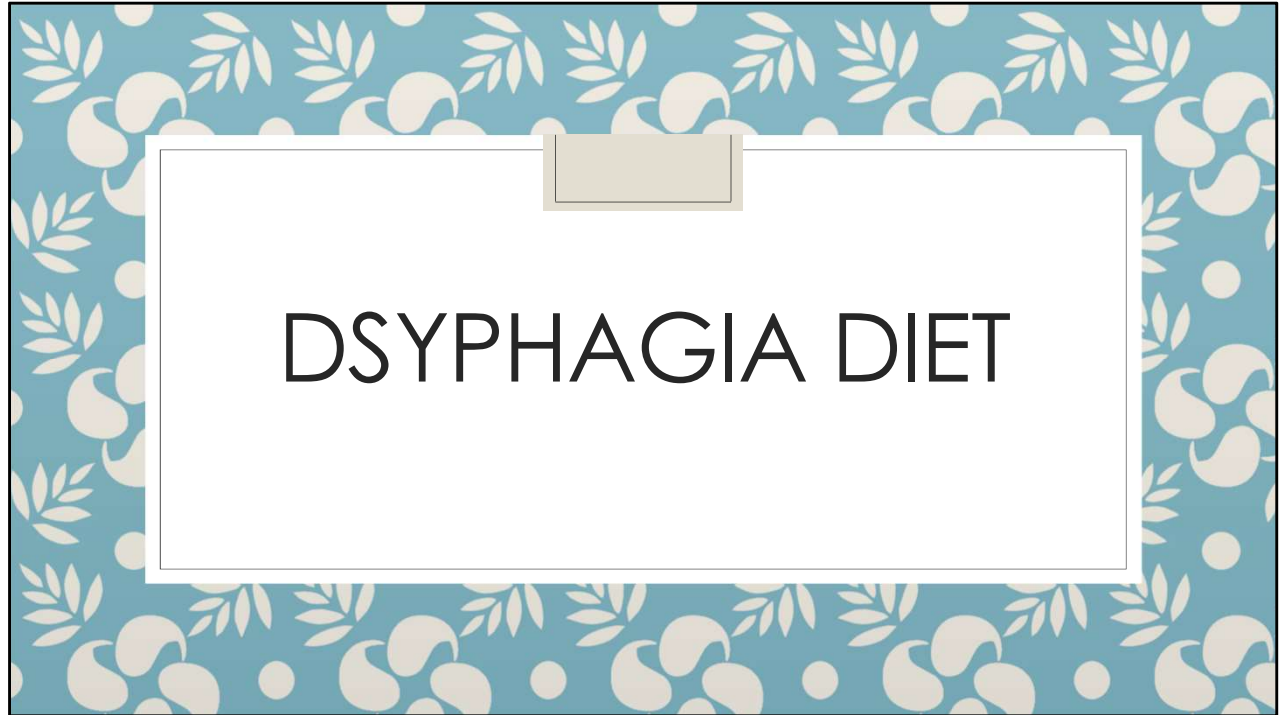
Product or food tested			
Heating method(s)			
Temperature when tested at:	<input type="checkbox"/> time of service	<input type="checkbox"/> 15 mins after serving	<input type="checkbox"/> 30 mins after serving

- Instructions:**
- Level 6 Soft & Bite-Sized **critical** tests include **Appearance + Fork/Spoon Pressure Test** OR if these are not available Finger Test.
 - For particle size: food intended to mimic a 'bite of food' – must be equal to or less than 15mm x 15mm (adults); equal to or less than 8mm x 8mm (pediatrics).
 - The food item must pass or meet criteria for any row marked *.

	Meets criteria at		
	Time of service	15 mins after serving	30 mins after serving
Critical: Appearance			
* Pieces less than or equal to 15mm x 15mm (adults); 8mm x 8mm (pediatrics)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
* No separate thin liquid	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Critical: Fork/Spoon Pressure Test (metal dinner fork or teaspoon needed)			
* When pushing down on a 15mm x 15mm sample with a dinner fork or teaspoon, with enough pressure that the thumb nail turns white, the food can be squashed and will not return to original shape	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
* Food can be separated into smaller pieces using pressure from a dinner fork or teaspoon held on its side	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Alternative if Fork or Spoon not available: Finger Test			
* When pushing down on a 15mm x 15mm sample using thumb, with enough pressure that the thumb nail turns white, the food can be squashed and will not return to original shape	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
* Food feels moist	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Optional: Chopstick Test			
Chopsticks can break 15mm x 15mm pieces into smaller pieces	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
OVERALL CONCLUSION: Does the sample meet the criteria for Level 6 Soft & Bite-sized?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No

- Notes:** * Chewing ability is needed for this texture, although biting is not required. Pieces should be 'bite-sized' at time of serving.
- * Please see also <http://iddsi.org/framework/food-testing-methods/>

Example of Power Point Slides for Dysphagia Module



Objectives



To identify causes and symptoms of dysphagia



To recognize the different types of dysphagia diets



To understand liquid thickener available in Michigan Medicine



To distinguish compliant food items for each of the dysphagia diets



To describe the role of multidisciplinary team members who provide care to patients with dysphagia

Types of Dysphagia

Oropharyngeal dysphagia

- Difficulty in transferring a liquid or food bolus from mouth to esophagus
- Leading cause: stroke

Video of normal swallow

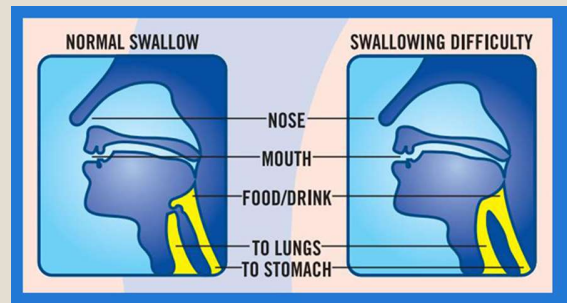
<https://www.youtube.com/watch?v=YQm5RCz9Pxc>

Dysphagia training video

<https://www.youtube.com/watch?v=ry3u2mWTfqo>

Esophageal dysphagia

- Food sticking in the base of the throat or in the chest
- Causes: localized neuromuscular disorders or obstructive lesions



Retrieve from: <https://understandingmyositis.org/myositis-complications/dysphagia/>

Play the video of normal swallow and swallowing difficulty (dysphagia)

Sign and Symptoms

- Eating meals more slowly
- Choking, coughing, or throat-clearing either during or after meals
- Feeling as if food is stuck in the throat or chest
- Delayed or absent of swallowing initiation
- Regurgitation
- Having frequent heartburn
- Having pain while swallowing (odynophagia)
- Drooling
- Being hoarse
- Unexpected weight loss



Test Your Knowledge

◦ Sally is a 79 years old female and was admitted to the hospital. Sally's nurse, Mary observes that Sally takes at least a couple hours to finish her cereal and milk in the morning. Sally also complains that she always feels that the food is stuck in her throat. Mary observed that Sally often time coughs when she was drinking orange juice.

◦ Based on your observation, do you think that Sally might have dysphagia?

_____ **YES**

_____ **NO**

Answer

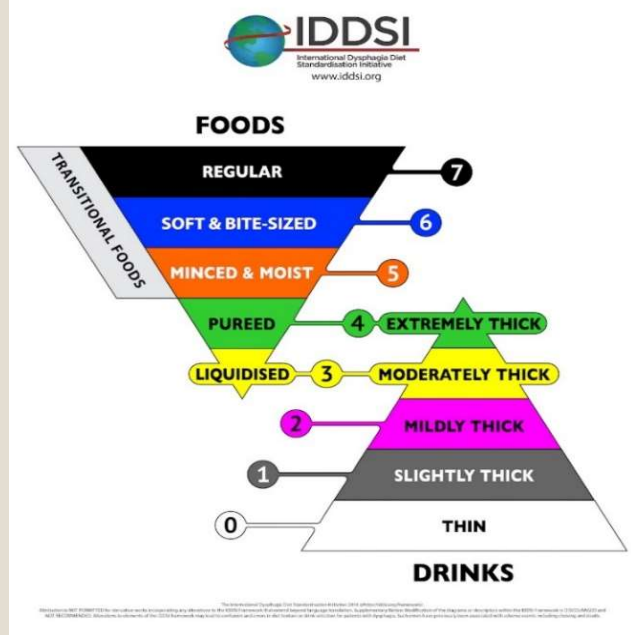
- **YES**

- Sally shows the sign and symptoms below:
 - Eating meals more slowly
 - Coughing during meals
 - Feeling as if food is stuck in the throat



- Founded in 2013 to unify terminologies used in dysphagia diets
- Consists of the volunteers from nutrition and dietetic, medicine, speech pathology, occupational therapy, nursing, patient safety, engineering, food science and technology from around the world
- Objective: develop *“a standardized terminology and definitions to describe texture modified foods and thickened liquids used for individuals with dysphagia of all ages, in all care settings, and all cultures.”*⁶

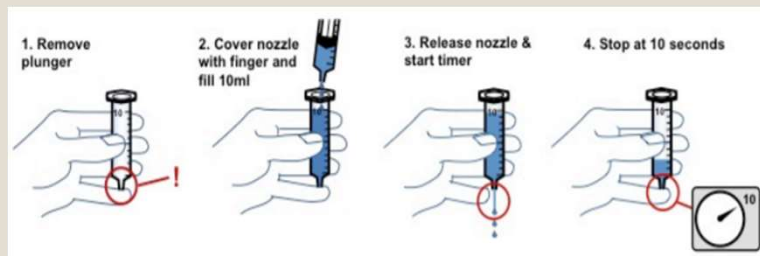
IDDSI Dysphagia Diet Framework⁶



IDDSI board developed a new dysphagia diet framework with eight levels of dysphagia diet and identifies them by numbers, text labels and color codes. Level 0 through 4 are used for beverages and level 3 through 7 are used for solid foods.

Gravity flow test for liquids

- Quantify liquid's flow and classify level 0-3
- Video: <https://youtu.be/BhfJWu1ybbs>



Step by step instruction to perform gravity flow test ⁶

A gravity flow test with 10mL slip tip hypodermic syringe is used to quantify the liquid's flow and classify IDDSI levels 0-3.

Simply thick

simplythick®
EasyMix™



New, improved and easy
to mix with a spoon!
Simply Different, Simply Better.®

- A thickening agent to thicken thin liquid to the consistency of dysphagia 2 and 3
- Available through Material Services
- Liquids allowed to be thicken: broth, juices, milk, coffee, tea and flavored water
 - NOT ALLOWED: frozen desserts and cream soup
- Oral supplements allowed to be thicken: Glucerna, Ensure Enlive, Ensure Plus, Nepro
 - NOT ALLOWED: Boost Breeze, Ensure Clear
 - Most up to date information: www.simplythick.com/supplements
- General guidelines:
 - Stir the mix in supplements for **1 full minute**
 - Supplements thickened should be consumed within **4 hours of preparation**

Sometime patients with liquid restrictions prefer the flavor of thin liquid over the thicken liquids that are available in the market.

SimplyThick, a thickening agent can be used to thicken thin liquid to the consistency of dysphagia 2 and 3, is available at Michigan Medicine through Material Services. Liquids that can be thickened include broth, juices, milk, coffee, tea and flavor water. Items that are not allowed to be thicken are frozen desserts such as popsicle, ice cream and milkshakes and cream soup such as cream of tomato soup.

Some oral supplements can be thickened.

The instructions for using SimplyThick to thicken liquids to the appropriate IDDSI liquid consistencies are printed on the back on the packet. Instructions include how many ounces of liquid to mix per packet of thickener and how long to stir the thickener into the liquid.

Level 4- DYS4 Pureed (green)

Characteristics:

- Holds its own shape
- Small peaks remain in the surface
- Too thick to drink from a cup or straw
- Use IDDSI fork-drip or spoon-tilt tests instead

Example of food items:

- Pureed Shaped Chicken
- Pureed Peas
- Mashed Potatoes
- Applesauce
- Pureed Peaches

Video: <https://youtu.be/dwQHMSByeEM>



Spoon Tilt Test for Dysphagia Level 4 Diet⁶

Level 4 is defined as puree food or extremely thick liquid (previously known as spoon thick). Food on this level does not require chewing and cannot be drunk from a cup or sucked through a straw. It can be piped, layered or molded and holds its own shape. The small peaks must remain in the surface. Fork drip or spoon tilt tests are recommended to evaluate food on this level.

Audit Sheet¹³

Intended for **4 EXTREMELY THICK**



Product or food tested			
If soup, heating method(s)			
Temperature when tested at:	<input type="checkbox"/> optimal serving temperature	<input type="checkbox"/> 15 mins after serving	<input type="checkbox"/> 30 mins after serving

Instructions:

- Level 4 Extremely Thick **critical tests** include **Appearance + Fork Drip Test + Spoon Tilt Test** OR if these are not available Finger Test. Chopstick test not appropriate.
- The food item must pass or meet criteria for any row marked *.

Tests: Suitable drinks, soups, nutritional supplements, gravies, sauces, liquid medications	Meets criteria at		
	Time of service	15 mins after serving	30 mins after serving
Critical: Appearance			
* No lumps	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Critical: Fork Drip Test (metal dinner fork needed)			
* Food sits in a mound above the dinner fork (a small amount may form a tail below the dinner fork)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
* Does not drip or flow continuously through the dinner fork	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Critical: Spoon Tilt Test (teaspoon needed)			
* Holds shape on teaspoon	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
* Food slides off spoon with little food left on teaspoon (i.e. not sticky)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
May spread or slump slowly on a flat plate	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Alternative if Fork or Spoon not available: Finger Test			
* Hold a sample on fingers without it dripping through continuously	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
* Food slides smoothly and easily between fingers	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Food leaves noticeable residue on fingers	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Preferred but not critical: Fork Pressure Test			
Prongs of fork make clear pattern on surface OR food briefly retains dinner fork indentation marks	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
OVERALL CONCLUSION: Does the sample meet the criteria for Level 4 Extremely Thick?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No

Notes: * Extremely Thick liquids need to be able to be put in the mouth and swallowed whole. No chewing and no bolus formation skills should be needed to eat this consistency.
 * Please see also <http://iddsi.org/framework/food-testing-methods/>

Level 5- DYS5 Minced and Moist (orange)

Characteristics:

- Food should be able to be formed into a ball or lump on a plate
- Food pieces size
 - Children and adults; 4 mm by 4 mm (fit between tines/prongs of a fork)

Example of food items:

- DYS5 Cod Potatoes
- DYS5 Chicken Noodles
- DYS5 Savory Beef
- DYS5 Lentil Stews
- All other compliant items on DYS 4

Video: <https://youtu.be/9tMowfeuzVY>



Fork test for Dysphagia Level 5 Diet⁶

Audit Sheet¹³

5 MINCED & MOIST



Testing intended for

Product or food tested			
Heating method(s)			
Temperature when tested:	<input type="checkbox"/> at time of service	<input type="checkbox"/> 15 mins after serving	<input type="checkbox"/> 30 mins after serving

Instructions:

- Level 5 Minced & Moist critical tests include **Appearance + Fork Pressure Test + Spoon Tilt Test** OR if these are not available Finger Test.
- For particle size: food intended to mimic a 'chewed bolus' – must be equal to or less than 4mm width and no longer than 15mm in length (adults); Equal to or less than 2mm width and no longer than 8mm length (pediatrics).
- The food item must pass or meet criteria for any row marked *.

Tests	Meets criteria at		
	Time of service	15 mins after serving	30 mins after serving
Critical: Appearance			
* Lumps less than or equal to 4mm (adults), 2mm (pediatrics)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
* No separate thin liquid	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Critical: Fork Pressure Test (metal dinner fork needed)			
* Food can be easily mashed with little pressure from a dinner fork [pressure should not make thumb nail blanch to white]	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
* Easily separates and comes through prongs of a dinner fork	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Critical: Spoon Tilt Test (teaspoon needed)			
* Holds shape on teaspoon	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
* Food slides off spoon with little food left on teaspoon (i.e. not sticky)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
May spread or slump slowly on a flat plate	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Alternative if Fork or Spoon not available: Finger Test			
* Small soft smooth rounded particles can be easily squashed between fingers	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
* Food feels moist and will leave fingers wet	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Optional: Chopstick Test			
Chopsticks can scoop or hold this texture if food is moist and cohesive	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
OVERALL CONCLUSION: Does the sample meet the criteria for Level 5 Minced & Moist?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No

Notes: * Minimal chewing should be needed to eat this food texture (e.g. tongue force should be able to squash/break food).
 * Please see also <http://iddsi.org/framework/food-testing-methods/>

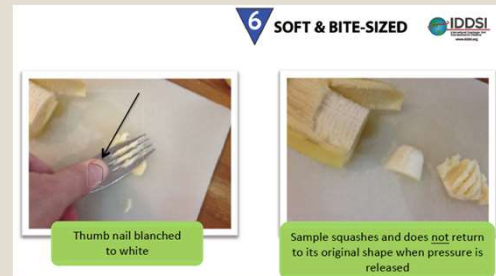
Level 6- DYS6 Soft Bite Size (blue)

Characteristics:

- Food that are easy to swallow
- Food pieces size
 - Children: 8 mm by 8 mm
 - Adult: 15 mm by 15 mm


Example of food items:


- DYS6 Macaroni N Cheese
- DYS6 Meatloaf
- DYS6 Pasta with Meat Sauce
- DYS6 Scrambled Eggs
- DYS 6 Chicken Fried Rice
- DYS 6 Turkey Tetrzzini
- All other compliant items on DYS4 and DYS5 diet



Fork test for Level 6 Diet⁶

Audit Sheet¹³





Testing intended for

Product or food tested			
Heating method(s)			
Temperature when tested at:	<input type="checkbox"/> Time of service	<input type="checkbox"/> 15 mins after serving	<input type="checkbox"/> 30 mins after serving

Instructions:

- Level 6 Soft & Bite-Sized **critical** tests include **Appearance + Fork/Spoon Pressure Test** OR if these are not available **Finger Test**.
- For particle size: food intended to mimic a 'bite of food' – must be equal to or less than 15mm x 15mm (adults); equal to or less than 8mm x 8mm (pediatrics).
- The food item must pass or meet criteria for any row marked *.

Tests	Meets criteria at		
	Time of service	15 mins after serving	30 mins after serving
Critical: Appearance			
* Pieces less than or equal to 15mm x 15mm (adults); 8mm x 8mm (pediatrics)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
* No separate thin liquid	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Critical: Fork/Spoon Pressure Test (metal dinner fork or teaspoon needed)			
* When pushing down on a 15mm x 15mm sample with a dinner fork or teaspoon, with enough pressure that the thumb nail turns white, the food can be squashed and will not return to original shape	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
* Food can be separated into smaller pieces using pressure from a dinner fork or teaspoon held on its side	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Alternative if Fork or Spoon not available: Finger Test			
* When pushing down on a 15mm x 15mm sample using thumb, with enough pressure that the thumb nail turns white, the food can be squashed and will not return to original shape	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
* Food feels moist	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Optional: Chopstick Test			
Chopsticks can break 15mm x 15mm pieces into smaller pieces	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
OVERALL CONCLUSION: Does the sample meet the criteria for Level 6 Soft & Bite-sized?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No

Notes:

- * Chewing ability is needed for this texture, although biting is not required. Pieces should be 'bite-sized' at time of serving.
- * Please see also <http://iddsi.org/framework/food-testing-methods/>

Test Your Knowledge

_____ This level requires food to be formed into a ball or lump on a plate and the food pieces will be measured 4 mm by 4 mm.

_____ This level holds its own shape and has no lumps or chunks. It has a smooth pureed texture.

_____ This level requires food that are easy to swallow, and the food pieces will be measured 8 mm by 8 mm.

- A. Level 4 – DYS 4 Pureed
- B. Level 5 – DYS 5 Minced and Moist
- C. Level 6 – DYS 6 Soft and Bite Size

Answer

B. Level 5 – DYS 5 Minced and Moist This level requires food to be formed into a ball or lump on a plate and the food pieces will be measured 4 mm by 4 mm.

A. Level 4 – DYS 4 Pureed This level holds its own shape and has no lumps or chunks. It has a smooth pureed texture.

C. Level 6 – DYS 6 Soft and Bite Size This level requires food that are easy to swallow, and the food pieces will be measured 8 mm by 8 mm.

Responsibilities and Roles

- Speech pathologists - evaluate patients' swallowing ability and recommend the appropriate level of dysphagia diet for liquid and solid food.
- Physicians - prescribe the patient an appropriate dysphagia diet
- Nurses are NOT allowed to overwrite food items that do not meet the requirements of dysphagia diet to prevent patients from **choking and aspiration**.
- Nurses should assist patients to select food items that meet their diet guidelines to ensure their patient's safety.
- Contact speech pathologists of their patient if questions or concerns arise.

Summary



Dysphagia is difficulty swallowing and can be caused by a number of medical conditions.



Dysphagia diets are very important for keeping patients safe.



Some side effects of untreated dysphagia can lead to pneumonia.



8 levels of dysphagia diets

Liquid consistency - Dysphagia level 0 to 3
Solid consistency - Dysphagia level 4 to 7

Dysphagia can be caused by various medical conditions including stroke, tumors, muscle weakness, cancer, et cetera.

Dysphagia level 0 to 3 liquid consistency.

- There are thin, slightly thick, mildly thick, moderately thick and extremely thick, respectively.

Dysphagia level 4 to 6 are used for solid consistency.

- Dysphagia 4 is for patients with severe dysphagia and includes pureed foods.
- Dysphagia level 5 minced and moist is for patients with moderate dysphagia and includes foods that have been minced or ground up at the size of 4mm by 4 mm.
- Dysphagia level 6 soft bite size is for patients with mild dysphagia and is a transition to a regular diet. It includes foods that are moist and cut into small pieces that are measure 15mm by 15 mm for adults and 8mm by 8mm for children.

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Example of Quiz for Dysphagia Module

- Dysphagia is defined as difficulty with:
 - Seeing
 - Speaking
 - Swallowing
 - Smelling
- Individuals of dysphagia are at a higher risk to have (Check all that apply)
 - Aspiration Pneumonia
 - Nausea and Vomiting
 - Malnutrition
 - Dehydration
 - Heart Disease
- There are seven (7) levels of dysphagia diets.

True False
- Simple Thick is available through
 - Patient Food and Nutrition Services
 - Pharmacy Department
 - Speech Pathologist
 - Material Services
- Which items can be thickened? (Check all that apply)
 - Vanilla Milkshakes
 - Strawberry Jello
 - Popsicles
 - Lipton Green Tea
 - Chicken Consommé
- A patient on a DYS 5 diet can order food items from:
 - DYS 6 menu
 - DYS 5 menu
 - DYS 4 menu
 - DYS 4 and DYS 5 menu
- Which food item is not compliant for DYS 5 Minced and Moist?
 - Pureed Shaped Peas
 - DYS 5 Chicken Noodle
 - Applesauce
 - Mac and Cheese
- Which food items are compliant for DYS 6 soft bite size? (Check all that apply)
 - Grapes
 - Mashed Potatoes
 - DYS 5 Lentil Stews
 - DYS 6 Scrambled Eggs
- The Registered Dietitian evaluates and recommends a particular texture for a solid and liquid diet.

True False
- Who can override non-compliant food items for patients on dysphagia diets? (Check all that apply)
 - Registered Nurse
 - Registered Dietitian
 - Speech Pathologist
 - Patient or patient's family member