

Antihyperlipidemic Drugs

Key Terms

<i>atherosclerosis</i>	<i>hyperlipidemia</i>
<i>bile acid sequestrants</i>	<i>lipids</i>
<i>catalyst</i>	<i>lipoprotein</i>
<i>cholesterol</i>	<i>low-density</i>
<i>high-density</i>	<i>lipoproteins (LDL)</i>
<i>lipoproteins (HDL)</i>	<i>rhabdomyolysis</i>
<i>HMG-CoA reductase</i>	<i>triglycerides</i>
<i>inhibitors</i>	

Chapter Objectives

On completion of this chapter, the student will:

- Discuss cholesterol, HDL, LDL, and triglyceride levels and how they contribute to the development of heart disease.
- Discuss therapeutic life changes and how they affect cholesterol levels.
- Discuss the general actions, uses, adverse reactions, contraindications, precautions, and interactions of antihyperlipidemic drugs.
- Discuss important preadministration and ongoing assessment activities the nurse should perform on the patient taking an antihyperlipidemic drug.
- List some nursing diagnoses particular to a patient taking an antihyperlipidemic drug.
- Discuss ways to promote an optimal response to therapy, how to manage common adverse reactions, and important points to keep in mind when educating patients about the use of an antihyperlipidemic drug.

Hyperlipidemia is an increase (*hyper*) in the **lipids** (*lipi*), which are a group of fats or fatlike substances in the blood (*demia*). **Cholesterol** and the **triglycerides** are the two lipids in the blood. Elevation of one or both of these lipids is seen in hyperlipidemia. Serum cholesterol levels above 240 mg/dL and triglyceride levels above 150 mg/dL are associated with atherosclerosis. **Atherosclerosis** is a disorder in which lipid deposits accumulate on the lining of the blood vessels, eventually producing degenerative changes and obstruction of blood flow. Atherosclerosis is considered to be a major contributor in the development of heart disease.

Triglycerides and cholesterides are insoluble in water and must be bound to a lipid-containing protein (**lipoprotein**) for transportation throughout the body. Although several lipoproteins are found in the blood, this chapter will focus on the low-density lipoproteins (LDL), the high-density lipoproteins (HDL), and cholesterol. **Low-density lipoproteins** (LDL) transport cholesterol to the peripheral cells. When the cells have all of the cholesterol they need, the excess cholesterol is discarded into the blood. This can result in an excess of cholesterol, which can penetrate the walls of the arteries, resulting in atherosclerotic

plaque formation. Elevation of the LDL increases the risk for heart disease. **High-density lipoproteins** (HDL) take cholesterol from the peripheral cells and bring it to the liver, where it is metabolized and excreted. The higher the HDL, the lower the risk for development of atherosclerosis. Therefore, it is desirable to see an increase in the HDL (the “good” lipoprotein) because of the protective nature of its properties against the development of atherosclerosis and a decrease in the LDL. A laboratory examination of blood lipids, called a lipoprotein profile, provides valuable information on the important cholesterol levels, such as:

- Total cholesterol
- LDL (the harmful lipoprotein)
- HDL (the protective lipoprotein)
- Triglycerides

Table 43-1 provides an analysis of cholesterol levels.

HDL cholesterol protects against heart disease, so the higher the numbers the better. An HDL level less than 40 mg/dL is low and considered a major risk factor for heart disease. Triglyceride levels that are borderline (150–190 mg/dL) or high (above 190 mg/dL) may need treatment in some individuals.

TABLE 43-1 Cholesterol Level Analysis

TOTAL CHOLESTEROL LEVEL*	CATEGORY
Less than 200 mg/dL	Desirable
200–239 mg/dL	Borderline
240 mg/dL and above	High
LDL CHOLESTEROL LEVEL*	LDL CHOLESTEROL CATEGORY
Less than 100 mg/dL	Optimal
100–129 mg/dL	Near optimal/above optimal
130–159 mg/dL	Borderline
160–189 mg/dL	High
190 mg/dL and above	Very high

*Cholesterol levels are measured in milligrams (mg) of cholesterol per deciliter (dL) of blood.

An increase in serum lipids is believed to contribute to or cause atherosclerosis, a disease characterized by deposits of fatty plaques on the inner walls of arteries. These deposits result in a narrowing of the lumen (inside diameter) of the artery and a decrease in blood supply to the area served by the artery. When these fatty deposits occur in the coronary arteries, the patient experiences coronary artery disease. Lowering blood cholesterol levels can arrest or reverse atherosclerosis in the vessels and can significantly decrease the incidence of heart disease.

Hyperlipidemia, particularly elevated serum cholesterol and LDL levels, is a risk factor in the development of atherosclerotic heart disease. Other risk factors, besides cholesterol levels, play a role in the development of hyperlipidemia. Additional risk factors include:

- Family history of early heart disease (father before the age of 55 years and mother before the age of 55 years)
- Cigarette smoking
- High blood pressure
- Age (men older than 45 years and women older than 55 years)
- Low HDL levels
- Obesity
- Diabetes

In general, the higher the LDL level and the more risk factors involved, the greater the risk for heart disease. The main goal of treatment in patients with hyperlipidemia is to lower the LDL to a level that will reduce the risk of heart disease.

The primary care provider may initially seek to control the cholesterol level by encouraging therapeutic life changes (TLC). This includes a cholesterol-lowering diet (TLC diet), physical activity, quitting smoking (if applicable), and weight management. The TLC diet is a

low-saturated fat and low cholesterol-eating plan that includes less than 200 mg of dietary cholesterol per day. In addition, 30 minutes of physical activity each day is recommended in the TLC. Walking a brisk pace for 30 minutes a day 5 to 7 days a week can help raise the HDL and lower LDL. Added benefits of a healthy diet and exercise program include a reduction of body weight. If TLC does not result in bringing blood lipids to therapeutic levels, the primary health care provider may add one of the antihyperlipidemic drugs to the treatment plan. The TLC is continued along with the drug regimen.

In addition to control of the dietary intake of fat, particularly saturated fatty acids, antihyperlipidemic drug therapy is used to lower serum levels of cholesterol and triglycerides. The primary health care provider may use one drug or, in some instances, more than one antihyperlipidemic drug for those with poor response to therapy with a single drug. Three types of antihyperlipidemic drugs are currently in use, as well as one miscellaneous antihyperlipidemic drug (see Summary Drug Table: Antihyperlipidemic Drugs for a complete listing of the drugs). The various types of drugs used to treat hyperlipidemia are:

- Bile acid sequestrants
- HMG-CoA reductase inhibitors
- Fibric acid derivatives
- Niacin

The target LDL level for treatment is less than 130 mg/dL. If the response to drug treatment is adequate, lipid levels are monitored every 4 months. If the response is inadequate, another drug or a combination of two drugs is used. Antihyperlipidemic drugs decrease cholesterol and triglyceride levels in several ways. Although the end result is a lower lipid blood level, each has a slightly different action.

ACTIONS

Bile Acid Sequestrants

Cholestyramine (Questran) and colestipol (Colestid) are examples of bile acid sequestrants. Bile, which is manufactured and secreted by the liver and stored in the gallbladder, emulsifies fat and lipids as these products pass through the intestine. Once emulsified, fats and lipids are readily absorbed in the intestine. These drugs bind to bile acids to form an insoluble substance that cannot be absorbed by the intestine, so it is secreted in the feces. With increased loss of bile acids, the liver uses cholesterol to manufacture more bile. This is followed by a decrease in cholesterol levels.

SUMMARY DRUG TABLE ANTIHYPERLIPIDEMIC DRUGS

GENERIC NAME	TRADE* NAME	USES	ADVERSE REACTIONS	DOSAGE RANGES
Bile Acid Sequestrants				
cholestyramine <i>koe-less'-tir-a-meen</i>	LoCHOLEST, Prevalite, Questran, Questran Light, generic	Hyperlipidemia, relief of pruritus associated with partial biliary obstruction	Constipation (may lead to fecal impaction), exacerbation of hemorrhoids, abdominal pain, distention and cramping, nausea, increased bleeding related to vitamin K malabsorption, vitamin A and D deficiencies	4 g PO 1–6 times/d; individualize dosage based on response
colestipol HCl <i>koe-les'-ti-pole</i>	Colestid	Hyperlipidemia	Constipation (may lead to fecal impaction), exacerbation of hemorrhoids, abdominal pain, distention and cramping, nausea, increased bleeding related to vitamin K malabsorption, vitamin A and D deficiencies	Granules: 5–30 g/d PO in divided doses; tablets: 2–16 g/d
colesevelam HCl <i>ko-leh-sev'-eh-lam</i>	Welchol	Adjunctive therapy used alone or with an HMG-CoA inhibitor to decrease elevated LDL cholesterol	Constipation (may lead to fecal impaction), exacerbation of hemorrhoids, abdominal pain, distention and cramping, nausea, increased bleeding related to vitamin K malabsorption, vitamin A and D deficiencies	3–6 tablets/d PO
HMG-CoA Reductase Inhibitors				
atorvastatin <i>ah-tor'-va-stah-tin</i>	Lipitor	Hyperlipidemia, reduction of elevated total and LDL cholesterol levels; increase HDL-C in patients with hypercholesterolemia	(Usually mild) headache, flatulence, abdominal pain, cramps, constipation, nausea	10–80 mg/d PO
fluvastatin <i>flue-va-sta'-tin</i>	Lescol, Lescol XL	Hyperlipidemia and mixed dyslipidemia, reduction of elevated total and LDL cholesterol levels, to slow progression of coronary artery disease (CAD), along with diet and exercise	(Usually mild) headache, flatulence, abdominal pain, cramps, constipation, nausea	20–80 mg/d PO
lovastatin <i>loe-va-sta'-tin</i>	Mevacor	Hyperlipidemia, reduction of elevated total and LDL cholesterol levels, to slow progression of CAD along with diet and exercise	(Usually mild) headache, flatulence, abdominal pain, cramps, constipation, nausea	10–80 mg/d PO in single or divided doses
pravastatin <i>prah-va-sta'-tin</i>	Pravachol	Hyperlipidemia, reduction of elevated total and LDL cholesterol levels, prevention of first MI, to slow progression of CAD, reduce risk of stroke, TIA, and MI	(Usually mild) headache, flatulence, abdominal pain, cramps, constipation, nausea	10–40 mg/d PO

(continued)

SUMMARY DRUG TABLE ANTIHYPERLIPIDEMIC DRUGS (Continued)

GENERIC NAME	TRADE* NAME	USES	ADVERSE REACTIONS	DOSAGE RANGES
simvastatin <i>sim-va-stah'-tin</i>	Zocor	Hyperlipidemia, reduction of elevated total and LDL cholesterol levels	(Usually mild) headache, flatulence, abdominal pain, cramps, constipation, nausea	5–80 mg/d PO
Fibric Acid Derivatives				
clofibrate <i>klo-fye'-brate</i>	Atromid-S, <i>generic</i>	Hyperlipidemia	Nausea, vomiting, GI upset, impotence, myalgia (muscle cramping and aching), increased or decreased angina, cardiac arrhythmias, fatigue, rash	2 g/d PO in divided doses
fenofibrate <i>fen-oh-figh'-brate</i>	Tricor	Hyperlipidemia, hypertriglyceridemia	Nausea, constipation, diarrhea, abnormal liver function tests, respiratory problems, rhinitis, abdominal pain, back pain, headache, asthenia, flu syndrome	54–160 mg/d PO
gemfibrozil <i>jem-fi'-broe-zil</i>	Lopid, <i>generic</i>	Hyperlipidemia, hypertriglyceridemia, reduction of coronary heart disease risk	Dyspepsia, abdominal pain, diarrhea, nausea, vomiting, rash, vertigo, headache	1200 mg/d PO in 2 divided doses 30 min before morning and evening meal
Miscellaneous Preparations				
niacin <i>nye'-a-sin</i> (nicotinic acid)	Niaspan	Adjunctive treatment for hyperlipidemia	Generalized flushing sensation of warmth, severe itching and tingling, nausea, vomiting, abdominal pain	1–2 g PO BID, TID; extended release: 500–2000 mg/d PO

*The term *generic* indicates the drug is available in generic form.

HMG-CoA Reductase Inhibitors

Another group of antihyperlipidemic drugs are called **HMG-CoA reductase inhibitors**. HMG-CoA (3-hydroxy-3-methylglutaryl coenzyme A) reductase is an enzyme that is a **catalyst** (a substance that accelerates a chemical reaction without itself undergoing a change) in the manufacture of cholesterol. These drugs appear to have one of two activities, namely, inhibiting the manufacture of cholesterol or promoting the breakdown of cholesterol. This drug activity lowers the blood levels of cholesterol and serum triglycerides and increases blood levels of HDLs. Examples of these drugs are fluvastatin (Lescol), lovastatin (Mevacor), and simvastatin (Zocor).

Fibric Acid Derivatives

Fibric acid derivatives, the third group of antihyperlipidemic drugs, work in a variety of ways. Clofibrate (Atromid-S), acts to stimulate the liver to increase breakdown of very-low-density lipoproteins (VLDL) to low-density lipoproteins (LDL), decreasing liver synthesis of

VLDL and inhibiting cholesterol formation. Fenofibrate (Tricor) acts by reducing VLDL and stimulating the catabolism of triglyceride-rich lipoproteins, resulting in a decrease in plasma triglyceride and cholesterol. Gemfibrozil (Lopid) increases the excretion of cholesterol in the feces and reduces the production of triglycerides by the liver, thus lowering serum lipid levels.

Miscellaneous Antihyperlipidemic Drug: Niacin

The mechanism by which niacin (nicotinic acid) lowers blood lipids is not fully understood.

USES

Bile Acid Sequestrants

The bile acid sequestrants are used as adjunctive therapy for the reduction of elevated serum cholesterol in patients with hypercholesterolemia who do not have an

adequate response to a diet and exercise program. Cholestyramine may also be used to relieve pruritus associated with partial biliary obstruction.

HMG-CoA Reductase Inhibitors

These drugs, along with a diet restricted in saturated fat and cholesterol, are used to treat hyperlipidemia when diet and other nonpharmacologic treatments alone have not resulted in lowered cholesterol levels.

Fibric Acid Derivatives

While the fibric acid derivatives have antihyperlipidemic effects, their use varies depending on the drug. For example, Clofibrate (Atromid-S) and gemfibrozil (Lopid) are used to treat individuals with very high serum triglyceride levels who present a risk of abdominal pain and pancreatitis and who do not experience a response to diet modifications. Clofibrate is not used for the treatment of other types of hyperlipidemia and is not thought to be effective for prevention of coronary heart disease. Fenofibrate (Tricor) is used as adjunctive treatment for the reduction of LDL, total cholesterol, and triglycerides in patients with hyperlipidemia.

Miscellaneous Antihyperlipidemic Drug: Niacin

Niacin is used as adjunctive therapy for the treatment of very high serum triglyceride levels in patients who present a risk of pancreatitis (inflammation of the pancreas) and who do not experience an adequate response to dietary control.

ADVERSE REACTIONS

Bile Acid Sequestrants

A common problem associated with the administration of the bile acid sequestrants is constipation. Constipation may be severe and may occasionally result in fecal impaction. Hemorrhoids may be aggravated. Additional adverse reactions include vitamin A and D deficiencies, bleeding tendencies (including gastrointestinal bleeding) caused by a depletion of vitamin K, nausea, abdominal pain, and distention.

HMG-CoA Reductase Inhibitors

HMG-CoA reductase inhibitors are usually well tolerated. Adverse reactions, when they do occur, are often mild and transient and do not require discontinuing therapy. The more common adverse reactions include nausea, vomiting, constipation, abdominal pain or cramps, and

headache. A rare, but more serious, adverse reaction is rhabdomyolysis.

Fibric Acid Derivatives

The adverse reactions associated with fibric acid derivatives include nausea, vomiting, gastrointestinal upset, and diarrhea. Clofibrate, fenofibrate, and gemfibrozil may increase cholesterol excretion into the bile, leading to cholelithiasis (stones in the gallbladder) or cholecystitis (inflammation of the gallbladder). If cholelithiasis is found, use of the drug is discontinued. Fenofibrate may also result in abnormal liver function tests, respiratory problems, back pain, and headache. Gemfibrozil may cause dyspepsia, skin rash, vertigo, and headache. See the Summary Drug Table: Antihyperlipidemic Drugs for additional adverse reactions.

Miscellaneous Antihyperlipidemic Drug: Niacin

Nicotinic acid may cause nausea, vomiting, abdominal pain, diarrhea, severe generalized flushing of the skin, a sensation of warmth, and severe itching or tingling.

CONTRAINDICATIONS, PRECAUTIONS, AND INTERACTIONS

Bile Acid Sequestrants

The bile acid sequestrants are contraindicated in patients with known hypersensitivity to the drugs. Bile acid sequestrants are also contraindicated in those with complete biliary obstruction. These drugs are used cautiously in patients with a history of liver or kidney disease. Bile acid sequestrants are used cautiously during pregnancy (Pregnancy Category C) and lactation (decreased absorption of vitamins may affect the infant).

The bile acids sequestrants, particularly cholestyramine, can decrease the absorption of numerous drugs. For this reason, the bile acid sequestrants should be administered alone and other drugs given at least 1 hour before or 4 hours after administration of the bile acid sequestrants. There is an increased risk of bleeding when the bile acid sequestrants are administered with oral anticoagulants. The dosage of the anticoagulant is usually decreased. The bile acid sequestrants may bind with digoxin, thiazide diuretics, penicillin, propranolol, tetracyclines, folic acid, and the thyroid hormones, resulting in decreased effects of these drugs.

HMG-CoA Reductase Inhibitors

The HMG-CoA reductase inhibitors are contraindicated in individuals with hypersensitivity to the drugs, serious liver disorders, and during pregnancy (Pregnancy

Category X) and lactation. The HMG-CoA reductase inhibitors are used cautiously in patients with a history of alcoholism, acute infection, hypotension, trauma, endocrine disorders, visual disturbances, and myopathy.

The HMG-CoA reductase inhibitors have an additive effect when used with the bile acid sequestrants, which may provide an added benefit in treating hypercholesterolemia that does not respond to a single-drug regimen. There is an increased risk of myopathy (disorders of the striated muscle) when the HMG-CoA reductase inhibitors are administered with erythromycin, niacin, or cyclosporine. When the HMG-CoA reductase inhibitors are administered with oral anticoagulants, there is an increased anticoagulant effect.

Fibric Acid Derivatives

The fibric acid derivatives are contraindicated in patients with hypersensitivity to the drugs and those with significant hepatic or renal dysfunction or primary biliary cirrhosis because these drugs may increase the already elevated cholesterol. The drugs are used cautiously during pregnancy (Pregnancy Category C) and lactation and in patients with peptic ulcer disease or diabetes. Although it rarely occurs, when the fibric acid derivatives, particularly gemfibrozil, are administered with the HMG-CoA reductase inhibitors, there is an increased risk for rhabdomyolysis (see Nursing Alert). When clofibrate, fenofibrate, or gemfibrozil is administered with the anticoagulants, there is an increased risk for bleeding.

Miscellaneous Antihyperlipidemic Drug: Niacin

Niacin is contraindicated in patients with known hypersensitivity to niacin, active peptic ulcer, hepatic dysfunction, and arterial bleeding. The drug is used cautiously in patients with renal dysfunction, high alcohol consumption, unstable angina, gout, and pregnancy (Category C).

Herbal Alert: Garlic

Garlic has been used for many years throughout the world. The benefits of garlic on cardiovascular health are the best known and most extensively researched benefits of the herb. Its benefits include lowering serum cholesterol and triglyceride levels, improving the ratio of HDL to LDL cholesterol, lowering blood pressure, and helping to prevent the development of atherosclerosis. The recommended dosages of garlic are 600 to 900 mg/day of the garlic powder tablets, 10 mg of garlic oil "perles," or one moderate-sized fresh clove of garlic a day. Adverse reactions include mild stomach upset or irritation that can usually be alleviated by taking the supplements with food. Although no serious reactions have occurred in pregnant women taking garlic, its use is not recommended. Garlic is excreted in breast milk and may cause colic in some infants.

NURSING PROCESS

● The Patient Receiving an Antihyperlipidemic Drug

ASSESSMENT

Preadministration Assessment

In many individuals, hyperlipidemia has no symptoms and the disorder is not discovered until laboratory tests reveal elevated cholesterol and triglyceride levels, elevated LDL levels, and decreased HDL levels. Often, these drugs are initially prescribed on an outpatient basis, but initial administration may occur in the hospitalized patient. Serum cholesterol levels (ie, a lipid profile) and liver functions tests are obtained before the drugs are administered.

The nurse takes a dietary history, focusing on the types of foods normally included in the diet. Vital signs and weight are recorded. The skin and eyelids are inspected for evidence of xanthomas (flat or elevated yellowish deposits) that may be seen in the more severe forms of hyperlipidemia.

Ongoing Assessment

The patient will usually take these drugs on an outpatient basis and come to the clinic or the primary health care provider's office for periodic monitoring. Frequent monitoring of blood cholesterol and triglyceride levels is done as a part of the ongoing assessment.

Nursing Alert

Sometimes a paradoxical elevation of blood lipid levels occurs. Should this happen, the primary health care provider is notified because the primary health care provider may prescribe a different antihyperlipidemic drug.

During the ongoing assessment, the nurse checks vital signs and assesses bowel functioning because an adverse reaction to these drugs is constipation. Constipation may become serious if not treated.

When administering the HMG-CoA reductase inhibitors and the fibric acid derivatives, the nurse monitors the patient's liver function by obtaining serum transaminase levels before the drug regimen is started, at 6 and 12 weeks, then periodically thereafter because of the possibility of liver dysfunction with the drugs. If aspartate aminotransferase (AST) levels increase to three times normal, the primary care provider is notified immediately because the HMG-CoA reductase inhibitor therapy may be discontinued.

Because the maximum effects of these drugs are usually seen within 4 weeks, periodic lipid profiles are performed to determine the therapeutic effect of the drug regimen. The primary health care provider may increase

Nursing Diagnoses Checklist

- ✓ **Constipation** related to adverse drug reactions
- ✓ **Risk for Imbalanced Nutrition: Less than Body Requirements** related to adverse drug reactions

the dosage, add another antihyperlipidemic drug, or discontinue the drug therapy, depending on the patient's response to therapy.

NURSING DIAGNOSES

Drug-specific nursing diagnoses are highlighted in the Nursing Diagnoses Checklist. Other nursing diagnoses applicable to these drugs are discussed in depth in Chapter 4.

PLANNING

The expected outcomes for the patient may include a therapeutic response to therapy (lowered blood lipid levels), management of common adverse drug reactions, and an understanding of the dietary measures necessary to reduce lipid and lipoprotein levels.

IMPLEMENTATION

Promoting an Optimal Response to Therapy

Because hyperlipidemia is often treated on an outpatient basis, the nurse explains the drug regimen and possible adverse reactions. If printed dietary guidelines are given to the patient, the nurse emphasizes the importance of following these recommendations. Drug therapy usually is discontinued if the antihyperlipidemic drug is not effective after 3 months of treatment.

Bile acid sequestrants may interfere with the digestion of fats and prevent the absorption of the fat-soluble vitamins (vitamins A, D, E, and K) and folic acid. When the bile acid sequestrants are used for long-term therapy, vitamins A and D may be given in a water-soluble form or administered parenterally. If bleeding tendencies occur as the result of vitamin K deficiency, parenteral vitamin K is administered for immediate treatment, and oral vitamin K is given for prevention of a deficiency in the future.

Monitoring and Managing Adverse Reactions

BILE ACID SEQUESTRANTS. Patients taking the antihyperlipidemic drugs, particularly the bile acid sequestrants, may experience constipation. The drugs can produce or severely worsen preexisting constipation. The nurse instructs the patient to increase fluid intake, eat foods high in dietary fiber, and exercise daily to help prevent constipation. If the problem persists or becomes

severe, a stool softener or laxative may be required. Some patients require decreased dosage or discontinuation of the drug therapy.



Gerontologic Alert

Older adults are particularly prone to constipation when taking the bile acid sequestrants. The nurse should monitor older adults closely for hard dry stools, difficulty passing stools, and any complaints of constipation. An accurate record of bowel movements must be kept.

HMG-CoA REDUCTASE INHIBITORS AND FIBRIC ACID DERIVATIVES. The antihyperlipidemic drugs, particularly the HMG-CoA reductase inhibitors, have been associated with skeletal muscle effects leading to rhabdomyolysis. **Rhabdomyolysis** is a very rare condition in which muscle damage results in the release of muscle cell contents into the bloodstream. Rhabdomyolysis may precipitate renal dysfunction or acute renal failure. The nurse is alert for unexplained muscle pain, muscle tenderness, or weakness, especially if they are accompanied by malaise or fever. These symptoms should be reported to the primary health care provider because the drug may be discontinued.

NIACIN. Patients taking nicotinic acid may experience moderate to severe generalized flushing of the skin, a sensation of warmth, and severe itching or tingling. Although these reactions are most often seen at higher dose levels, some patients may experience them even when small doses of nicotinic acid are administered. The sudden appearance of these reactions may frighten the patient.



Nursing Alert

The nurse should advise the patient taking nicotinic acid to put the call light on if discomfort is experienced. Contact the primary health care provider before the next dose is due should this adverse reaction occur. If the patient is in severe discomfort, the nurse should contact the primary health care provider immediately. The nurse advises outpatients to contact their primary health care provider if these reactions are severe or cause extreme discomfort.

Educating the Patient and Family

The nurse stresses the importance of following the diet recommended by the primary health care provider because drug therapy alone will not significantly lower cholesterol and triglyceride levels. The nurse provides a copy of the recommended diet and reviews the contents of the diet with the patient and family. If necessary, the



Patient and Family Teaching Checklist

Using Diet and Drugs to Control High Blood Cholesterol Levels

The nurse:

- ✓ Reviews the reasons for the drug and prescribed drug therapy, including drug name, form and method of preparation, correct dose, and frequency of administration.
- ✓ Emphasizes that drug therapy alone will not significantly lower blood cholesterol levels.
- ✓ Stresses importance of taking drug exactly as prescribed.
- ✓ Reinforces the importance of adhering to prescribed diet.
- ✓ Provides a written copy of dietary plan and reviews contents.
- ✓ Contacts dietitian for assistance with diet teaching.
- ✓ Answers questions and offers suggestions for ways to reduce dietary fat intake.
- ✓ Instructs in possible adverse reactions and signs and symptoms to report to primary health care provider.
- ✓ Reviews measures to minimize gastrointestinal upset.
- ✓ Explains possible need for vitamin A and D therapy and high-fiber foods if patient is receiving bile acid sequestrant.
- ✓ Reassures that results of therapy will be monitored by periodic laboratory and diagnostic tests and follow-up with primary health care provider.

nurse refers the patient or family member to a teaching dietitian, a dietary teaching session, or a lecture provided by a hospital or community agency (see Patient and Family Teaching Checklist: Using Diet and Drugs to Control High Blood Cholesterol Levels). The nurse develops a teaching plan to include the following information:

BILE ACID SEQUESTRANTS

- Take the drug before meals unless the primary health care provider directs otherwise.
- Cholestyramine powder: The prescribed dose must be mixed in 4 to 6 fluid ounces of water or noncarbonated beverage and shaken vigorously. The powder can also be mixed with highly fluid soups or pulpy fruits (applesauce, crushed pineapple). The powder should not be ingested in the dry form. Other drugs are taken 1 hour before or 4 to 6 hours after cholestyramine. Cholestyramine is available combined with the artificial sweetener, aspartame (Questran Light), for patients with diabetes or those who are concerned with weight gain.

- Colestipol granules: The prescribed dose must be mixed in liquids, soup, cereals, carbonated beverages, or pulpy fruits. The granules will not dissolve. Therefore, when mixing with a liquid, slowly stir the preparation until ready to drink. Take the entire drug, rinse the glass with a small amount of water, and drink.
- Colesevelam: Mix the granules in liquids, soups, cereals, or pulpy fruits. Do not take dry. Mix the prescribed amount in a glassful of liquid. Carbonated beverages should be stirred slowly in a large glass. The tablets are taken twice daily without regard to meals.
- Constipation, flatulence, nausea, and heartburn may occur and may disappear with continued therapy. The primary health care provider is notified if these effects become bothersome or if unusual bleeding occurs.

HMG-CoA INHIBITORS

- Lovastatin is taken once daily, preferably with the evening meal. Fluvastatin, pravastatin, and simvastatin are taken, without regard to meals, once daily in the evening or at bedtime.
- If fluvastatin or pravastatin is prescribed with a bile acid sequestrant, take fluvastatin 2 hours after the bile acid sequestrant and pravastatin at least 4 hours afterward.
- Contact the primary health care provider as soon as possible if nausea; vomiting; muscle pain, tenderness, or weakness; fever; upper respiratory infection; rash; itching; or extreme fatigue occurs.

FIBRIC ACID DERIVATIVES

- Clofibrate: If gastrointestinal upset occurs, take the drug with food. Notify the primary health care provider if chest pain, shortness of breath, palpitations, nausea, vomiting, fever, chills, or sore throat occurs.
- Gemfibrozil: Dizziness or blurred vision may occur. Observe caution when driving or performing hazardous tasks. Notify the primary health care provider if epigastric pain, diarrhea, nausea, or vomiting occurs.

MISCELLANEOUS PREPARATION

- Nicotinic acid: Take this drug with meals. This drug may cause mild to severe facial flushing, feeling of warmth, severe itching, or headache. These symptoms usually subside with continued therapy, but contact the primary health care provider as soon as possible if symptoms are severe. The primary health care provider may prescribe aspirin (325 mg) to be taken about 30 minutes before nicotinic acid to decrease the flushing reaction. If dizziness occurs, avoid sudden changes in posture.

EVALUATION

- The therapeutic effect is achieved and serum lipid levels are decreased.
- Adverse reactions are identified, reported to the primary health care provider, and managed successfully through successful nursing interventions.
- The patient and family demonstrate an understanding of the treatment regimen.

● Critical Thinking Exercises

1. A patient in the medical clinic is taking cholestyramine (Questran) for hyperlipidemia. The primary health care provider has prescribed TLC for the patient. The patient is on a low-fat diet and walks daily for exercise. His major complaint at this visit is constipation, which is very bothersome to him. Discuss how you would approach this situation with the patient. What information would you give the patient concerning his constipation?
2. Discuss the important points to include in a teaching plan for a patient who is prescribed atorvastatin (Lipitor).
3. Describe the important aspects of the ongoing assessment when administering fluvastatin to a patient.

● Review Questions

1. Which of the following adverse reactions is most common in a patient taking a bile acid sequestrant?
 - A. Anorexia
 - B. Vomiting
 - C. Constipation
 - D. Headache
2. Lovastatin (Mevacor) is best taken _____.
 - A. once daily, preferably with the evening meal
 - B. three times daily with meals

- C. at least 1 hour before or 2 hours after meals
- D. twice daily without regard to meals

3. When assessing a patient taking cholestyramine (Questran) for vitamin K deficiency, the nurse would _____.
 - A. check the patient for bruising
 - B. keep a record of the patient's intake and output
 - C. monitor the patient for myalgia
 - D. keep a dietary record of foods eaten
4. A patient taking niacin reports flushing after each dose of the niacin. Which of the following drugs would the nurse expect to be prescribed to help alleviate the flushing?
 - A. Demerol
 - B. Aspirin
 - C. Vitamin K
 - D. Benadryl
5. Which of the following points would the nurse include when teaching a patient about drug and diet therapy for hyperlipidemia?
 - A. Fluids are taken in limited amounts when eating a low-fat diet.
 - B. The medication should be taken at least 1 hour before meals.
 - C. Medication alone will not lower cholesterol.
 - D. Meat is not allowed on a low-fat diet.

● Medication Dosage Problems

1. A patient is prescribed 10 mg simvastatin (Zocor) PO daily for high cholesterol. The drug is available in 5-mg tablets. The nurse administers _____.
2. The primary care provider prescribes fenofibrate (Tricor) for the treatment of hypertriglyceridemia. The patient is now taking 200 mg/d PO. Is this an appropriate dosage? If not, what action would you take? If the dose is appropriate, how many capsules would you administer if the drug is available in 54-mg capsules?