to lower serum cholesterol to below 200 mg/dL and low-density lipoprotein cholesterol to below 130 mg/dL, weight reduction if overweight, control of blood pressure if hypertensive, avoidance of smoking, stress reduction techniques, exercise program designed and supervised by a health care provider).
- Assist the client and family to understand the importance of complying with medication orders to prevent re-infarction and other complications, and continued medical supervision.

Evaluation

- Observe for signs and symptoms of thromboembolic disorders or bleeding.
- Check blood coagulation tests for therapeutic ranges.
- Observe and interview regarding compliance with instructions about drug therapy.
- Observe and interview regarding adverse drug effects.

PRINCIPLES OF THERAPY

Drug Selection

Choices of anticoagulant and antiplatelet drugs depend on the reason for use and other drug and client characteristics.

1. Heparin is the anticoagulant of choice in acute venous thromboembolic disorders because the anticoagulant effect begins immediately with IV administration.
2. Warfarin is the anticoagulant of choice for long-term maintenance therapy (ie, several weeks or months) because it can be given orally.
3. Aspirin has long been the most widely used antiplatelet drug for prevention of myocardial reinfarction and arterial thrombosis in clients with TIAs and prosthetic heart valves. However, clopidogrel may be more effective than aspirin.
4. When anticoagulation is required during pregnancy, heparin is used because it does not cross the placenta. Warfarin is contraindicated during pregnancy.
5. Various combinations of antithrombotic drugs are used concomitantly or sequentially (eg, abciximab is used with aspirin and heparin; thrombolytic drugs are usually followed with heparin and warfarin).

Regulation of Heparin and Warfarin Dosage

Heparin dosage is regulated by the activated partial thromboplastin time (aPTT), which is sensitive to changes in blood clotting factors, except factor VII. Thus, normal or control values indicate normal blood coagulation; therapeutic values indicate low levels of clotting factors and delayed blood coagulation. During heparin therapy, the aPTT should be maintained at approximately 1.5 to 2.5 times the control or baseline value. The normal control value is 25 to 35 seconds; therefore, therapeutic values are 45 to 70 seconds, approximately. With continuous IV infusion, blood for the aPTT may be drawn at any time; with intermittent administration, blood for the aPTT should be drawn approximately 1 hour before a dose of heparin is scheduled. Monitoring of aPTT is not necessary with low-dose standard heparin given subcutaneously for prophylaxis of thromboembolism or with the LMWHs (eg, enoxaparin).

Warfarin dosage is regulated according to the INR, for which therapeutic values are 2.0 to 3.0 in most conditions. An average daily dose of 4 to 5 mg maintains a therapeutic INR; stopping warfarin returns an elevated INR to normal in approximately 4 days in most clients.

The INR is based on prothrombin time (PT). PT is sensitive to changes in three of the four vitamin K–dependent coagulation factors. Thus, normal or control values indicate normal levels of these factors; therapeutic values indicate low levels of the factors and delayed blood coagulation. A normal baseline or control PT is approximately 12 seconds; a therapeutic value is approximately 1.5 times the control, or 18 seconds.

When warfarin is started, PT and INR should be assessed daily until a stable daily dose is reached (the dose that maintains PT and INR within therapeutic ranges and does not cause bleeding). Thereafter, PT and INR are determined every 2 to 4 weeks for the duration of oral anticoagulant drug therapy. If the warfarin dose is changed, PT and INR are needed more often until a stable daily dose is again established.

For many years, the PT was used to regulate warfarin dosage. PT is determined by adding a mixture of thromboplastin and calcium to citrated plasma and measuring the time (in seconds) it takes for the blood to clot. However, values vary among laboratories according to the type of thromboplastin and the instrument used to measure PT. The INR system standardizes the PT by comparing a particular thromboplastin with a standard thromboplastin designated by the World Health Organization. Advantages of the INR include consistent values among laboratories, more consistent warfarin dosage with less risk of bleeding or thrombosis, and more consistent reports of clinical trials and other research studies. Some laboratories report both PT and INR.

Warfarin dosage may need to be reduced in clients with biliary tract disorders (eg, obstructive jaundice), liver disease (eg, hepatitis, cirrhosis), malabsorption syndromes (eg, steatorrhea), and hyperthyroidism or fever. These conditions increase anticoagulant drug effects by reducing absorption of vitamin K, decreasing hepatic synthesis of blood clotting factors, or increasing the breakdown of clotting factors. Despite these influencing factors, however, the primary determinant of dosage is the PT and INR.

Warfarin interacts with many other drugs to cause increased, decreased, or unpredictable anticoagulant effects (see Nursing Actions). Thus, warfarin dosage may need to be increased or decreased when other drugs are given concomitantly. Most drugs can be given if warfarin dosage is titrated according to the PT or INR and altered appropriately when an interacting drug is added or stopped. INR or PT measurements and vigi-