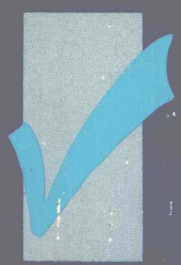
Second Edition

# Review of Nursing

## Essentials for the State Boards

Stewart M. Brooks, Editor



*Includes simulated NCLEX-RN*

*Corresponds to new State Boards*

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STEWART M. BROOKS, EDITOR

NATALIE A. BROOKS, ASSOCIATE EDITOR

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# REVIEW OF NURSING

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*This book is dedicated to*

*Tom Dyke*

*with fond memories from*

*Bucky and Nat*

# Preface

The response to the first edition confirms our belief that the Review of Nursing serves as a readable, ready reference for nursing students, practicing nurses, and related health professionals. Clearly, all seek more information for study and examination purposes as well as for client care. In the instance of the state board examination (NCLEX-RN), the review helps to allay fears and may very well enhance scores.

This second edition continues to try to meet these various needs in the context of current, accurate data and adequate, relevant coverage of each area. The material is categorized along recognized clinical lines, each chapter prefaced by a summary outline and, where appropriate, a basic science overview. Supportive material (for example, information on fluid-electrolyte balance) is provided by an exhaustive appendix and glossary. Time-tested diagnostic questions follow each part, with the answers and rationales placed at the back of the book. Properly used, these serve to assess the reader's understanding and handling of the subject matter.

All content and questions in the second edition have been updated to conform to the new format of the NCLEX-RN. Review of essential content should improve a student's mastery of vital nursing topics, and the clinically oriented questions following each major topic encourage application of that knowledge to client situations by way of the nursing process.

To provide a final test, we have added a simulated NCLEX-RN containing 480 questions in four parts to this new edition. By providing students with a "dress rehearsal," we hope to expose them to the format, content, and timing of the real exam so that they may refine their test-taking techniques and catch any last-minute deficiencies in knowledge.

We wish to express our appreciation for the assistance of Dr. Eugene C. Laforet, Boston University School of Medicine, and Drs. Sadamu Ishikawa and Henry M. Yager, Tufts University School of Medicine. Also, thanks to all the people at Little, Brown who worked on the book in one way or another; we are especially grateful to Ann West, Nursing Editor, and Phyllis Mitzman, Book Editor. And last, but by no means least, what would we have done without Lila Gardner!

Stewart M. Brooks
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**Notice**

The indications and dosages of all drugs in this book have been recommended in the medical literature and conform to the practices of the general medical community. The medications described do not necessarily have specific approval by the Food and Drug Administration for use in the diseases and dosages for which they are recommended. The package insert for each drug should be consulted for use and dosage as approved by the FDA. Because standards for usage change, it is advisable to keep abreast of revised recommendations, particularly those concerning new drugs.

# Introduction



## NURSING BELIEFS

Nursing is a health profession that encompasses both art and science in its attempt to facilitate the growth of the individual, family, and community. Man's nature is the foundation of nursing beliefs. Man is in dynamic interaction with the environment, including social, mental, physical, and spiritual aspects of his being. Nursing seeks to maintain homeostasis of man's being by minimizing stressors that may alter his health state. In this concept, nursing assists man in achieving, maintaining, or restoring his health to the extent chosen by the individual.

## NURSING PROCESS

The nursing process is the foundation of nursing care that artificially divides nursing action (behavior) into subcomponents for analysis. In reality each phase blends into the next, overlapping on a circular continuum. The five components of the process include assessing, analyzing, planning, implementing, and evaluating. (In this review, for the sake of convenience, the first two phases of the process are incorporated under the heading "Assessment," and the remaining phases under the heading "Intervention.")

### Assessing

Assessing is collecting all available data about a client for the purpose of diagnosing problems and planning appropriate care. The information is divided into two major categories: subjective and objective. Subjective information is what the client, the family, or others tell you about the client. It is classified as "subjective" because it is not concrete information that can be absolutely verified. Objective information is that which you can see, hear, smell, or touch. It includes physical examination and diagnostic tests as well as psychosocial observations.

### Analyzing

Following assessment the next step is organizing and analyzing the data. This is like putting together

a jigsaw puzzle. Each part may not have significant value by itself, but when placed among other pieces, a picture appears. From the analysis of the data evolves the nursing diagnoses. These are the conclusions reached on the basis of the assessment data and will provide the foundation for planning care.

### Planning

Planning is establishing an approach to what can be done for your client. It involves setting mutually acceptable goals with your client, identifying interventions to be taken to attain these goals, and coordinating the interdisciplinary health care team. It also involves judging priorities. Often goals may conflict, such as resting and ambulating. A priority must be determined and care planned to allow implementation of nursing care.

### Implementing

With goals set and clear interventions established, the next phase is to put the plan into action. The interventions will encompass physical care, teaching, assisting other health personnel, psychosocial care, counseling, supervision, and documentation of actions taken. The implementation phase is a challenge. The nurse will be organizing the interdisciplinary team, delegating certain responsibilities, and providing direct client and family care — and all the while acting as a diplomat to ensure that the needs of all the people involved are met.

### Evaluating

The success of the plan is evaluated during this phase. In essence the client is reassessed and the new level of health is compared with the goals previously established. This is when you determine whether or not the goals have been reached. If they have been attained, new, higher level goals or goals to maintain the client at this level of functioning are defined, along with interventions to reach any new goals. If the goals were not met, the nurse must try to ascertain why this happened. It may be that the client did not share the same goals and thus compliance was minimal, or that the goals were unrealistic and beyond the reach of the client, or that the interventions were inappropriate to meet the goals. At this point goals and interventions are revised and the new plan is implemented.

## LICENSURE EXAMINATION

Entry into the practice of nursing in the United States and its territories requires that a candidate for licensure pass an examination called NCLEX (National Council of Licensure Examination). The RN (our concern here) and LPN examinations are called NCLEX-RN and NCLEX-PN respectively. The Examination Committee of the National Council of State Boards of Nursing, which is responsible for preparing the exam, is composed of board members, staff members or both, selected from the boards of nursing in the participating states and territories. The two-day examination is given twice a year, in February and July. All participating states administer the examination on the same dates at sites selected separately by each state.

The nursing process and client systems serve as the basis for the test plan. Each of the five components ("behaviors") of the nursing process is allotted ninety-six multiple-choice questions in the context of the three systems of client health requirements. Twenty to 30 percent of the test items reflect the system in which the locus of decision making is centered in the nurse; 55 to 65 percent, the system in which the locus of decision making is shared by the nurse and client; and 10 to 20 percent, the system in which the locus of decision making is centered in the client. These "weightings" reflect situations and settings where the majority of registered nurses are initially employed.

The 480 test items are divided arbitrarily into four parts (120 items each) — called Book I, Book II, Book III, and Book IV — for ease in administration and to provide an appropriate respite. The exam is given a single score, which ranges from 800 to 3,200. The passing score is 1,600 ("minimal competency"), and the passing rate averages about 85 percent.

# Contents

# MEDICAL-SURGICAL NURSING

# I

*Special Note:*
Fluid-electrolyte and acid-base imbalances, cardinal features of many clinical situations, are discussed at the appropriate place throughout this review. Normal values (as for plasma electrolytes) are given in Appendix 10 and technical terms (like milliequivalent) are explained in the glossary.

# Cardiovascular-Hematologic Disorders

# 1



## ANATOMY-PHYSIOLOGY OVERVIEW

The circulatory system consists of the heart, blood vessels, and blood. The heart is a muscular pump divided into four chambers: two atria and two ventricles. Venous blood is collected from the systemic veins into the venae cavae. From the venae cavae blood empties into the right atrium, passes through the tricuspid valve into the right ventricle, and is pumped through the pulmonary valve into the pulmonary artery and then through the lungs. Normal pressures within the superior vena cava are 5 to 10 cm $H_2O$ (4 to 8 mm Hg); within the right atrium, 0 to 4 cm $H_2O$ (0 to 3 mm Hg); and within the pulmonary artery, 25/10 mm Hg. Oxygenated blood passes from the lungs into the four pulmonary veins, which empty directly into the left atrium. The blood then passes through the bicuspid (mitral) valve into the left ventricle and is pumped out into the aorta through the aortic valve and then to the arterial system. Normal pressures in the left atrium are $<$ 12 mm Hg and in the aorta, 120/80 mm Hg.

In health, the amount of blood that enters the heart and the amount that leaves the heart (cardiac output) are equal. According to the law of the heart (Starling's law), the volume of blood pumped by the heart is normally determined by the volume of blood returning to it. Within limits, the greater the ventricular and diastolic myofibril stretch, the more forceful the contraction and the more blood is ejected. When the body is placed under stress by variables, such as increased activity, fear, or fever, the cardiac output is increased to meet this need.

The normal cardiac stroke volume is 50 to 100 ml; the normal cardiac output is approximately 5 to 6 liters per minute.

The heart is surrounded by the pericardium, a membranous sac consisting of two layers: an outer fibrous layer and an inner serous layer. The fibrous layer forms a strong protective covering surrounding the heart and great vessels. The serous layer, which consists of a visceral and a parietal layer, secretes a serous fluid that serves to facilitate movement of the heart. The visceral layer, or epicardium, serves as the first or outer layer of the heart. The second layer, the middle layer of tissue, is the myocardium. The myocardium is the muscle mass of the heart and has the inherent properties of rhythmicity, automaticity, and contractility. The third layer, or inner layer, is the endocardium, a thin membrane that is continuous with the endothelial lining of the blood vessels. It lines the inner surface of the heart and assists in forming the valves.

Nervous innervation to the heart includes fibers from the sympathetic and parasympathetic nervous system. Stimulation of the parasympathetic fibers (vagus nerve) slows the heart and decreases contractility, rate of conduction through the atrioventricular (AV) node, and coronary blood flow; stimulation of the sympathetic fibers increases heart rate (chronotropic effect), contractility (inotropic effect), automaticity, and coronary blood flow. Due to the inherent myocardial rhythmicity, alternate contraction and relaxation are provided by the cardiac muscle itself. The rate of firing in the sinoatrial (SA) node is normally more rapid than that of the rest of cardiac muscle. Consequently, this area normally originates the cardiac impulse and is called the pacemaker of the heart. Thus the cardiac impulse originates in the SA node, spreads through the atria, passes through the atrioventricular node, down the bundle of His, down the left and right bundle branches, and out through the Purkinje's fibers. On the electrocardiogram (EKG, ECG) the P wave represents atrial depolarization, since the impulse originates in the SA node and passes through the atria; the P-R interval represents the time it takes the impulse to originate in the SA node and pass through the atria, AV node, bundle of His, and into the bundle branches. The normal P-R interval is 0.12 to 0.20 second. The QRS represents ventricular depolarization as the impulse passes down the bundle branches and out into the Purkinje's fibers. The normal QRS interval is 0.06 to 0.10 second. The ST segment represents the refractory period; the T wave represents repolarization.

The vascular system carries the blood from the heart (arteries) to small microscopic structures, where nutrients, gases, and waste products are exchanged (capillaries), and back to the heart (veins). The lymphatic vessels serve as an accessory system for the flow of fluid, electrolytes, and protein from the tissue spaces back into the venous circulation.

The arteries are composed of three coats: the tunica intima, or endothelial coat, which provides a smooth surface for blood flow; the tunica media, the strong muscular-elastic coat; and the tunica externa (adventitia), or outside coat of connective tissue, which supports and protects the artery. As the arteries subdivide into smaller vessels, they contain less and less connective and elastic tissue. The smallest arteries, the arterioles, are composed mostly of smooth muscle, a fact that explains their pronounced effect on peripheral resistance. The arterioles run into the capillaries, vessels whose walls consist of only a single layer of endothelial cells. The veins, like the arteries, are composed of three coats, differing in the comparative weakness of the middle coat. In the so-called gravity veins, semilunar valves serve to prevent backflow of blood.

Blood pressure refers to the force exerted by the blood against the walls of the vessels. Because there are three types of vessels, there are three blood pressures: arterial, venous, and capillary. The maintenance of arterial blood pressure relates to several factors, viz., rate and force of the heart (cardiac output), elasticity of the large vessels, peripheral resistance, blood volume, and blood viscosity. Cardiac output and blood volume, the most important factors, depend on sympathetic stimulation initiated at the cardiac and vasomotor centers of the medulla oblongata. These centers respond to the needs of the body by means of a variety of sensory mechanisms involving chemoreceptors and baroreceptors. A loss of blood, for example, brings about vasoconstriction of the arterioles (thereby increasing peripheral resistance and blood pressure) and the shunting of blood to vital areas (e.g., heart and brain) from less vital areas (e.g., skin and muscle).

Blood flow is affected by pressure, vessel length and diameter, and blood viscosity. The major regulators of blood flow are the arterioles. Deficiency in oxygen concentration is a powerful stimulant to arteriolar dilatation. Overall distribution of blood through the system is controlled by the sympathetic

nervous system. An increase in sympathetic impulses causes constriction of the vessels in the skin and viscera and dilation of those in skeletal muscle; a decrease in sympathetic impulses has the opposite effect. This mechanism is capable of shifting blood flow in times of crisis to vital areas, for example, the heart and brain. The exchange of gases, nutrients, and wastes between the capillaries and tissue fluid is brought about by the physical process of diffusion; for example, oxygen and nutrients pass into the tissue fluid and wastes and carbon dioxide pass into the blood. The exchange of fluid between the blood and tissue fluid — a key feature of water balance and homeostasis — depends essentially on the difference between hydrostatic pressure and colloidal osmotic pressure (oncotic pressure). Normally, the fluid that leaves the capillaries at the arteriolar end (as a result of a greater hydrostatic pressure) is balanced by the return of fluid to the capillaries at the venular end (as a result of a greater oncotic pressure).

The blood consists of a pale-yellow fluid, the plasma, and suspended cellular elements (or corpuscles), which include erythrocytes (red blood cells), leukocytes (white blood cells), and thrombocytes (platelets). Red cells develop from erythroblasts in the red bone marrow, the major erythropoietic activity occurring in the flat and irregular bones. By virtue of their hemoglobin content, red cells transport oxygen (as oxyhemoglobin) and in concert with the plasma (by means of the chloride shift) transport carbon dioxide. Red cells circulate for about 120 days, after which they are destroyed (phagocytized) in the spleen, liver, and red bone marrow. The hemoglobin is composed of globin and heme; and heme is composed of iron and porphyrin. The iron, which is released in the process from the heme portion of the molecule, is used over again in the synthesis of new hemoglobin, whereas porphyrin is converted into bile pigments and eventually eliminated from the body. Proper hemopoiesis depends on the presence of a normal genetic precursor for erythrocyte formation, healthy bone marrow, and a diet supplying adequate amounts of protein, iron, copper, vitamin $B_{12}$, folic acid, and pyridoxine.

Leukocytes include granulocytes (neutrophils, eosinophils, and basophils) and agranulocytes (lymphocytes and monocytes). Granulocytes develop from myeloblasts in the bone marrow, and agranulocytes develop from similar cells in lymphatic tissue. Granulocytes (e.g., neutrophils) and monocytes engage in phagocytosis, and lymphocytes serve as the keystone of the body's immunity system. More particularly, T lymphocytes (originally processed in the fetal thymus gland) are responsible for delayed hypersensitivity (graft rejection, and so on) whereas B lymphocytes are responsible for antibody formation. In brief, B lymphocytes, in response to antigenic stimulation, become plasma cells, the latter elaborating immunoglobulins (antibodies). Immunoglobulins (categorized as IgG, IgA, IgM, IgD, and IgE) constitute the so-called gamma globulin fraction of the plasma. Thrombocytes, or platelets, are oval, granular bodies, without a nucleus, which are merely fragments of large cells (megakaryocytes) found in the bone marrow. They perform several important functions in hemostasis. Those that escape disintegration in the clotting process are probably destroyed in the reticuloendothelial system.

Blood coagulation is a highly complex biochemical maneuver, which to this day is not completely understood. The current overview holds that there are three phases. In phase I, platelet factor (from disintegrating platelets) plus tissue factors interact with a number of plasma factors (including $Ca^{++}$) to produce thromboplastin; in phase II, thromboplastin, in the presence of calcium ions and certain accelerator plasma factors, converts prothrombin into thrombin; in phase III, thrombin converts soluble fibrinogen into insoluble fibrin, the structural substance of the clot. Blood clots that have formed in the tissues and in small vessels are eventually dissolved (fibrinolysis) by fibrinolysin (or plasmin), an enzyme formed from a plasma precursor called profibrinogen (or plasminogen).

The lymphatic system is structurally and functionally related to the cardiovascular system. It helps in the removal of interstitial (tissue) fluid and plays an important role in protecting the body through the mechanisms of phagocytosis and antibody production. Lymphatic structures include lymphatic vessels (which transport lymph, or excess interstitial fluid, from the tissue back to the blood) and related lymphatic organs (viz., lymph nodes, spleen, tonsils, and thymus gland).

## ARTERIOSCLEROSIS; ATHEROSCLEROSIS

Cardiovascular disease, the leading cause of death in North America and western Europe, for the most part relates to arteriosclerosis and atherosclerosis.