MINISTRY OF PUBLIC HEALTH OF UKRAINE

ZAPOROZHYE STATE MEDICAL UNIVERSITY

DEPARTMENT OF PROPEDEUTICS OF INTERNAL DISEASES WITH PATIENTS' CARE

THE MAIN DUTIES AND PROFESSIONAL ACTIVITIES OF A MEDICAL NURSE IN A THERAPEUTICS DEPARTMENT

Manual

(for the third-year students of the international faculty and teachers – chiefs of practice)

ZAPOROZHYE - 2016

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The methodical recommendations are approved by the Central Methods Board of ZSMU
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INTRODUCTION

The program of study of educational discipline "Nursing Practice" prepared in accordance with the educational and vocational training programs "specialist" direction 1201 "Medicine" specialty 7.12010001 "General medicine and 7.12010002 "Pediatrics", the curriculum, approved by the Ministry of Health of Ukraine № 414 of 23.07. 2007.

The subject of study of discipline on the 3rd course is to acquire theoretical knowledge, practical skills and mastering the ability to module 1 "The main duties and professional activities of medical nurse in therapeutic department".

The Program consists of the following modules:

Module 1. The main duties and professional activities of medical nurse in therapeutic department.

Module 2. The main duties and professional activities of medical nurse in surgical department.

Module 3. The main duties and professional activities of medical nurse in pediatric department.

The aim and objectives of discipline

1.1. The goal of teaching "Nursing Practice" is demonstrate the method of application of standards in medical technology practice nurse.

1.2. The main objectives of the discipline "Nursing Practice" is theoretical material on the specifics of the therapeutic department, basic manipulations and their nurse working under the supervision of a teacher.

1.3. As required educational and professional program students must:

know: the basic principles of medical ethics and deontology, organizing treatment and care of patients with various diseases therapeutic profile, keeping medical records therapeutic treatment facility;

be able to: work of manipulation of a medical nurse in basic structural subdivisions of therapeutic hospital;

have a concept: the use of modern methods of examination in diagnostics of internal diseases and methods of preparation for these patients.

In studying the discipline given 120 hours 4 ECTS credits, of which the module 1 - 40 hours/1.33 credits.

The information amount of discipline

MODULE 1: THE MAIN DUTIES AND PROFESSIONAL ACTIVITIES OF MEDICAL NURSE IN THERAPEUTIC DEPARTMENT

Topic 1. Moral-ethical and legislative principles of nursing in Ukraine. Organization of labor and duties of a medical nurse in basic structural subdivisions of therapeutic hospital.

Ethical fundamentals of nursing. Moral code of a nurse in Ukraine. International Council code of nurses. Florence Nightingale oath. A medical nurse's moral and legal responsibility to society. Guarantees and protection of a medical nurse constituted rights. List of orders of the Ministry of Public Health of Ukraine that regulate the work of a medical nurse in therapeutics departments.

Therapeutic hospital's structure and functions. Basic subdivisions of therapeutic hospital: admission department, departments of therapeutic profile, diagnostics departments, clinical laboratory. Duties of a medical nurse in basic subdivisions of therapeutic hospital. List of documentation, which a medical nurse keeps in different subdivisions of therapeutic hospital. The main rules of medical preparations and instruments' storage. Duties of a medical nurse to maintain medical-security and hygiene and sanitary regimes in therapeutic department.

Topic 2. Organization of a nurse's duties in therapeutic hospital. Responsibilities and actions of medical and manipulation nurses in therapeutic department.

Organization of a nurse's on duty labor. Documentation, which is filled in by a nurse on duty and rules of its keeping. Registration of patients, which are admitted to the departments. Thermometry, checking up the arterial blood pressure, control of

pulse and recording of data. Work with prescription lists. Rules of providing patients with tablets and dissolved medical preparations.

Organization of a medical nurse labor in manipulation room. Keeping records in manipulation room. Rules of storage and registration of medicinal preparations and instruments in manipulation room. Prescribing, taking stock and storage of strong medicines, drugs and poisons according to the order currently in force.

Methods and techniques of taking of general blood analysis, blood sugar analysis, biochemical and bacteriological examinations. Preparing of manipulation table for work. Subcutaneous, intramuscular, intravenous injections technique. Calculation of soluble antibiotics dose. Rules of filling up system for transfusion and intravenous infusions. The main requirements to disinfection and sterilization of instruments. Quality control of instruments' pre-sterilization for determination of blood and detergents substances remains. Sterilization of instruments for repeated using.

Topic 3. Medical nurse's duties to ensure diagnostic process in therapeutic hospital.

The main rules of patients' preparation for gastroscopy, proctoscopy, and colonoscopy, ultrasonic scanning of abdominal cavity organs. The main types of enemas and rules of their administration.

Preparation of patients and instruments for stool test for eggs of worms, blood traces, coprogram. Rules of collecting urine for Zimnitsky's test, Nechiporenko test, Kakovsky-Addis test, their diagnostic importance.

Preparation and carrying out of duodenal probe. Gastric lavage, ways of its performance, taking washings for examination. Preparation of probes, catheters and tips for manipulations.

Methods and techniques of electrocardiogram's registration. Simple analysis of its main elements. Acquaintance with the method of echocardioscopy research. Leadthrough of researches of tests of ventilator function. Work of nurse of cabinet of functional diagnostics.

Topic 4. Features of the procedure cabinet in therapeutic department and responsibilities of the medical nurse in order to provide them.

Organization of medical nurse labor in procedure unit. Rules of storing medical instruments in procedure unit. The main types of compresses. Rules of warm, cold, medicinal compresses applying. Methods of applying cups, mustard plasters, hot-water bottle and ice bags. Processing and disinfection of medicinal instruments for repeated usage. Applying of leeches, conditions of their keeping. Rules of applying pocket inhalators and hospital inhalators. Methods and technique of humid oxygen supply and using of oxygen bag.

Acquaintance with physiotherapeutic procedures (hydrotherapeutic procedures, light procedures, electromagnetic procedures): methods of their applying, observation of patients and first aid in case of getting worse while taking physiotherapeutic procedures.

Final module control.

Structure of discipline

Names of modules, thematic modules and topics	Amount of hours			
	Total	including		
		L.	Pr.	Ind.w.
1	2	3	4	5
Module 1. The main duties and professional activities of medical nurse in therapeutic department.				
Topic 1. Moral-ethical and legislative principles of nursing in Ukraine. Organization of labor and duties of a medical nurse in basic structural subdivisions of therapeutic hospital.	9,5	-	2,5	7
Topic 2. Organization of a nurse's duties in therapeutic hospital. Responsibilities and actions of medical and manipulation nurses in therapeutic department.	8,5	-	2,5	6
Topic 3. Medical nurse's duties to ensure diagnostic process in therapeutic hospital.	8,5	-	2,5	6
Topic 4. Features of the procedure cabinet in therapeutic department and responsibilities of the medical nurse in order to provide them. Final module control.	13,5	-	2,5	11
TOTAL	**40**	**-**	**10**	**30**

Topics of practical classes

№	Topics	Hours
1.	Moral-ethical and legislative principles of nursing in Ukraine. Organization of labor and duties of a medical nurse in basic structural subdivisions of therapeutic hospital.	2,5
2.	Organization of a nurse's duties in therapeutic hospital. Responsibilities and actions of medical and manipulation nurses in therapeutic department.	2,5
3.	Medical nurse's duties to ensure diagnostic process in therapeutic hospital.	2,5
4.	Features of the procedure cabinet in therapeutic department and responsibilities of the medical nurse in order to provide them. Final module control.	2,5
TOTAL		**10**

Independent work

№	Topics	Hours
1	Getting to know your current job descriptions and orders regulating the professional activities of a nurse	1
2	Preparation for practical classes (1.5 hours/topic)	6
3	Independent working skills and abilities described in list of practical training (4.5 hours/topic)	18
4	Filling of basic report documentation: Journal of practical training and Final report	2
5	Preparation for the final control	3
TOTAL		**30**

MODULE 1: THE MAIN DUTIES AND PROFESSIONAL ACTIVITIES OF A MEDICAL NURSE IN A THERAPEUTICS DEPARTMENT.

Topic 1. Moral-ethical and legislative principles of nursing in Ukraine. Organization of labor and duties of a medical nurse in basic structural subdivisions of therapeutic hospital.

FLORENCE NIGHTINGALE

1820-1910

She became a nurse in spite of her wealthy family's opposition. A true angel of mercy, Florence Nightingale served with the British army during the Crimean War, turning filthy, vermin-infested camps where the wounded were brought to die into clean wards where they could heal. She returned a hero but refused to participate in any public celebration. Rather, she used her stature to gain Queen Victoria's support for health-care reform in the military. Nightingale then worked for improved conditions in hospitals and workhouses, and established the first school for nurses. She accomplished all this despite spending the last 40 years of her life as an invalid.

Decide how you will impact the world.

Nightingale was born into wealth and the Victorian role of a society woman. She didn't need to work and didn't need to accomplish anything by the norms of that society. However, she demanded more of herself. "I see so many of my kind who have gone mad for want of something to do," she wrote.

Follow your heart and religious faith.

When Nightingale was seventeen, she felt a divine inspiration. "God spoke to me . . . and called me to His service," she said. She listened and then moved into action.

Ignore society's stereotypes.

In Nightingale's time, nursing was considered a disreputable occupation performed by women who alcoholics and prostitutes. That didn't stop Nightingale from pursuing her career in health care and, in process, helping to legitimize the nursing profession.

Stand up for yourself.

Sometimes you have to stand up to those you love most in order to turn your dreams into realities. Nightingale's parents were strongly opposed to her pursuit of a nursing career. It would have been easy to buckle under that kind of pressure, or to substitute their judgment for hers, but Nightingale didn't allow that to happen. She took the initiative and studied nursing on her own, eventually convincing her family

that she was doing the right thing.

Be courageous.

Nightingale risked her life by going into a war zone and exposing herself to disease on a mass scale, but her focus was always on her patients. Her courage had its roots in her commitment to her cause. Because she was so committed, the cause was more important than the risks involved. On the eve of her departure for the Crimea, her sister Parthe wrote that Nightingale was "as calm and composed as if she was going for a walk."

When one road is blocked, take another.

When those in authority try to block your path, seek an alternative. Upon arriving at Barrack Hospital, Nightingale met opposition from army doctors who resented her presence. She made progress in the areas of cleanliness and food preparation, and in time won the respect of the soldiers and eventually the doctors.

Learn to write well.

Nightingale, like Clara Barton, Eleanor Roosevelt, Margaret Thatcher and Mother Teresa, depended on letter writing to advance her cause. During her time in the Crimea, from November 1854 to July 1856, she wrote about 300 detailed letters, many of them to government officials, such as Sidney Herbert. Nightingale's letters on reforms, packed with facts and statistical information to support her points, were used by Sidney Herbert and other cabinet officials to make "important changes in the British Army organization during the course of the Crimean War."

Move into action.

Nightingale said, "Words ought all to be distilled into actions and into actions which bring results." Nightingale always followed that path.

Pay attention to details.

Throughout her career, Nightingale maintained records and relied on statistical information to make the best decisions as a hospital administrator, and later as a head nurse during the Crimean War.

Don't be lured by materialism.

There is nothing wrong with the pursuit of wealth, but don't love things more than you love people. That's the Florence Nightingale way.

Be honest about your accomplishments.

After returning from the Crimea, Nightingale became a media celebrity and was praised in poems, songs, portraits and figurines. She could have easily brushed aside

the failures of the Crimea, but she didn't. Instead, she honored the dead by highlighting the medical failures, and used that as the starting point for medical reforms in the British Army. "[Nightingale] used the truth to push Victorian England into a burst of social progress that may justify a claim that the pioneering National Health Service was born on the floor of the Scutari Barrack Hospital," Huge Small wrote. Nightingale said: "I stand at the altar of the murdered men, and, while I live, I fight their cause."

Avoid false praise.

Regarding the praise she received for her nursing efforts, Nightingale wrote in 1888: "I often think, or rather do not like to think . . . how all the people who were with me in the Crimea must feel how unjust it is that all the 'Testimonial' went to me."

Remember that all progress, however small, is valuab1e.

As many as 14,000 British soldiers died needlessly from disease during the Crimean War. Out of that catastrophe, however, came the reforms that led to improved care for the war wounded and sick. "Never lose an opportunity of urging a practical beginning, however small, for it is wonderful how often in such matters the mustard-seed germinates and roots itself," Nightingale said.

Be a hands-on person.

To assess the needs of patients at Barrack Hospital, Nightingale, after working hard all day, personally made her rounds at night in the massive structure to talk with the soldiers. When Nightingale opened the Nightingale Training School for Nurses, she personally selected the superintendent and interviewed the prospective students. In order to help change the image of nurses, Nightingale wanted to make certain her students were of the highest moral character.

Don't rest on your laurels.

After the Crimean War, Nightingale could have stopped working because her place in history was assured. However, like so many women of influence, she looked for new challenges and ways to be useful. As she got older, she was still able to accomplish some of her most important work. Through letters and contacts, Nightingale helped introduce health reforms in India.

Defend those who can't defend themselves.

"The soldiers were victims; her deepest instinct was to be the defender of

victims," Woodham-Smith wrote.

Therapeutic hospital consists of admission department, departments of therapeutic profile, diagnostics departments, clinical laboratory.

Admission department is a part of a hospital, intended for the registration, receiving of patients, examination, sanitary hygienic treatment of patients and rendering urgent medical aid. Each patient to be received must feel careful and affable altitude to himself, only in this case a patient will confide in the medical establishment where he will be treated.

Admission department a medical nurse duties:

1) observation of the sanitary regime;
2) attending a patient to a doctor's room;
3) conducting patient's sanitation;
4) transporting and attending patient into the profile department.

Admission department consists of the waiting room, registration, examination room (one or several), sanitation point, procedure room, dressing room. In large hospitals there are a small operating room, a traumatological room, X-ray room and a laboratory. In the reception department there must be an isolation ward to accommodate the patients, who are suspected for an infectious disease. Admission department works in strict consistency: 1) registration of patients; 2) medical examination; 3) sanitary hygienic treatment.

Waiting room is intended for the patients, who don't need bed regime, and for their relatives accompanying them. There must be a table and enough chairs here. On the walls there is information on therapeutic departments work, attending doctor's hours for conversation with patient's relatives, the list of products permitted. Next to it there is a registration where patients registering and filling in the necessary documentation is performed and inquiry office.

A doctor examined patients in an examination room, makes a provisional diagnosis and determines the sanitation form. Here thermometry and sometimes other studies (e.g. electrocardiography) are carried out. In cases when a patient is brought in a grave or an unconscious condition he is given medical aid without wasting time for registering and only after that all the necessary information is gathered either from the patient himself or from his relatives or person accompanying him. Procedure room, dressing room and a small operating room are intended to give an emergency aid. There is a sanitary admission room for the patients (a bath, a shower, a room for changing clothes and so on).

A reception department must be equipped with the following inventory: stretchers, wheel cart, linen, and patients' clothes.

The therapeutic department consists: rooms for patients, sanitary knot (bath, shower, rest room), dining-room for patients, procedure units, manipulation room, room for doctors (intern) and head by the department.

Topic 2. Organization of a nurse's duties in therapeutic hospital. Responsibilities and actions of medical and manipulation nurses in therapeutic department.

Thermometry

Body temperature represents the balance between heat produced by metabolism, muscular activity, and other factors and heat lost through the skin, lungs, and body wastes. A stable temperature pattern promotes proper function of cells, tissues, and organs; a change in this pattern usually signals the onset of illness.

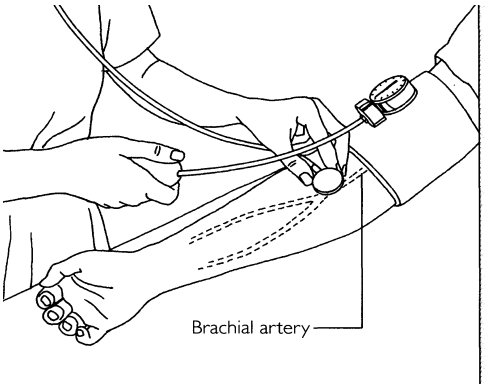
Temperature can be measured with a mercury, an electronic digital, or a chemical-dot thermometer. Oral temperature in adults normally ranges from 36.1° to 37.5°C; rectal temperature, the most accurate reading, is usually 0.6°C higher; axillary temperature, the least accurate, reads 0.6° to 1.1°C lower; and tympanic temperature reads 0.5° to 1°C higher.

Temperature normally fluctuates with rest and activity. Lowest readings typically occur between 4 and 5 a.m.; the highest readings occur between 4 and 8 p.m. Other factors also influence temperature, including sex, age, emotional conditions, and environment. Keep the following principles in mind. Women normally have higher temperatures than men, especially during ovulation. Normal temperature is highest in neonates and lowest in elderly persons. Heightened emotions raise temperature; depressed emotions lower it. A hot external environment can raise temperature; a cold environment lowers it.

Taking arterial pressure

The automated vital signs monitor is a noninvasive device that measures pulse rate, systolic and diastolic pressures, and mean arterial pressure at preset intervals.

Positioning the blood pressure cuff



Wrap the cuff snugly around the upper arm above the antecubitai area (the inner aspect of the elbow). When measuring an adult's blood pressure, place the lower border of the cuff about 2,5 cm above the antecubital space. The center of the cuff bladder should rest directly over the medial aspect of the arm. Most cuffs have an arrow for you to position over the brachial artery. Then place the bell of the stethoscope on the brachial artery at the point where you hear the strongest beats.

Implementation

• Tell the patient that you're going to take his blood pressure.

• The patient can lie supine or sit erect during blood presure measurement. His arm should be extended at heart level and be well supported. *If the artery is below heart level, you may get a false-high reading.* Make sure the patient is relaxed and comfortable when you take his blood pressure so *it stays at its normal level.*

• Wrap the deflated cuff snugly around the upper arm.

• If necessary, connect the appropriate tube to the rubber bulb of the air pump and the other tube to the manometer. Then insert the stethoscope earpieces into your ears.

• Locate the brachial artery by palpation. Center the bell of the stethoscope over the part of the artery where you detect the strongest beats, and hold it in place with one hand. *The bell of the stethoscope transmits low-pitched arterial blood sounds more effectively than does the diaphragm.*

• Using the thumb and index finger of your other hand, turn the thumbscrew on the rubber bulb of the air pump clockwise to close the valve.

• Then pump air into the cuff while auscultating for the sound over the brachial artery *to compress and, eventually, occlude arterial blood flow.* Continue pumping air until the mercury column or aneroid gauge registers 160 mm Hg or at least 10 mm Hg above the level of the last audible sound.

• Carefully open the valve of the air pump, and then slow-deflate the cuff - no faster than 5 mm Hg/second. While releasing air, watch the mercury column or aneroid

gauge and auscultate for the sound over the artery.

• When you hear the first beat or clear tapping sound, note the pressure on the column or gauge. This is the systolic pressure. (The beat or tapping sound is the first of five Korotkoff sounds. The second sound resembles a murmur or swish; the third sound, crisp tapping; the fourth sound, a soft, muffled tone; and the fifth, the last sound heard.)

• Continue to release air gradually while auscultating for the sound over the artery.

• Note the diastolic pressure - the fourth Korotkoff sound. If you continue to hear sounds as the column or gauge falls to zero (common in children), record the pressure at the beginning of the fourth sound. This is important *because, in some patients, a distinct fifth sound is absent.*

• Rapidly deflate the cuff. Record the pressure, wait 15 to 30 seconds, and then repeat the procedure and record the pressures *to confirm your original findings.* After doing so, remove and fold the cuff, and return it to storage.

Research of a pulse

Blood pumped into an already-full aorta during ventricular contraction creates a fluid wave that travels from the heart to the peripheral arteries. This recurring wave - called a pulse - can be palpated at locations on the body where an artery crosses over bone on firm tissue. In adults the radial artery in the wrist is the most common palpation site. Because auscultation is done at the heart's apex, this is called the apical pulse.

An apical-radial pulse is taken by simultaneously counting apical and radial beats - the first by auscultation at the apex of the heart, the second by palpation at the radial artery. Some heartbeats detected at the apex can't be detected at peripheral sites. When this occurs, the apical pulse rate is higher than the radial; the difference is the pulse deficit.

Pulse taking involves determining the rate (number of beats per minute), rhythm (pattern or regularity of the beats), and volume (amount of blood pumped with each beat). If the pulse is faint or weak, use a Doppier ultrasound blood flow detector if available.

Taking a radial pulse

• Place the patient in a sitting or supine position, with his arm at his side or across his chest.

• Gently press your index, middle, and ring fingers on the radial artery, inside the

patient's wrist. You should feel a pulse with only moderate pressure; *excessive pressure may struct blood flow distal to the pulse site.* Don't use your thumb to take the patient's pulse *because your thumb's own strong pulse may be confused with the patient's pulse.*

• After locating the pulse, count the beats for 60 seconds, or count for 30 seconds and multiply by 2. *Counting for a full minute provides a more accurate picture of irregularities.* While counting the rate, assess pulse rhythm and volume by noting the pattern and strength of the beats. If you detect an irregularity, repeat the count, and note whether it occurs in a pattern or randomly. If you're still in doubt, take an apical pulse.

Then it is necessary to determine whether the pulses are equal on the both hands. Normally they are equal. If the pulses are unequal, this is called *pulsus differens.* Pulsus differens in observed in anomalies of the radial artery (it goes to the back side of the hand and the usual place is occupied by its branch), in pathological changes: aortic arch aneurysm, mediastinal tumors, narrowing of the left atrioventricular orifice when enlarged left atrium presses the subclavicular artery and the pulse of the left hand, especially in the left decubitus, decreases (Popov-Saveliev sign), when a tumor or enlarged lymph nodes compress the artery, when the lumina of the large vessels are compressed with scars.

After comparison of the pulse on the both hands, it is necessary to study the properties the pulse on one hand. If the pulse is different on the both hands, it is studied on the hand where it is more intensive.

The following properties are to be determined. **Pulse rate**, the number of pulse beats per minute. In healthy individuals pulse rate is 60-80 beats per minute. Rapid pulse (pulsus frequens, may be due to physiological conditions. In women the pulse rate is 7-8 beats more than in man, the pulse accelerates with physical work, excitement, during digestion, on breathing in, in persons over 60, in some diseases (it increases by 8-10 beats per each degree of the body temperature, in thyrotoxicosis, anemia, acute and chronic diseases of the heart, endocarditis, myocarditis, pericarditis, cardiac failure, after taking some drugs and poisons, such as alcohol, atropine, caffeine, adrenaline). In typhoid fever at fever of 40 degrees the pulse may

be 76-80 per minute (relative bradycardia), in tuberculous meningitis due to excitation of the vagus nerve under the influence of increased intracranial pressure bradycardia may be observed.

Pulse rate disorders: a) rapid; b) rare. In healthy subjects a rare pulse (pulsus rarus, <60) is not frequent, chiefly observed in sleep. Pulse deceleration is observed in the following pathological conditions: complete atrioventricular blockage, stenosis of the aorta orifice, cachexia, hanger, jaundice, cerebral hemorrhage, brain tumors, fracture of the skull, myxedema.

Rhythm of the pulse, the beats follow with equal intervals and are equal, i.e. regular pulse (pulsus regularis). In disturbances of the heart function, this regularity changes, it becomes arrhythmical, irregular, an irregular pulse (pulsus irregularis). Three types of arrhythmias are observed: extrasystole (extraordinary heart contractions), the interval between this and the following contraction can be unusually long (compensatory pause), ciliary arrhythmia (disordered pulse waves are palpated), paroxysmal tachycardia (very frequent pulsation which is difficult to count, appearing and disappearing suddenly).

If the pulse is arrhythmical, it is necessary to determine if the number of the pulse waves corresponds to the number of the heart contractions. In frequent arrhythmical contractions of the heart, separate systoles of the left ventricle may be so weak that the blood is not ejected to the aorta, or the amount of the blood is so small that the pulse wave does not reach the periphery. The difference between the number of the heart contractions and pulse waves per one minute is termed *pulse deficiency*, the pulse is called *a deficiency pulse* (pulsus deficiens). The more is the deficiency, the more unfavorable is its effect on the blood supply of the organs and tissues. Pulse rhythm disorders: a) extrasystole; b) bigeminal pulse; c) ciliary arrhythmia.

Pulse tension is the pressure of the blood exercised on the wall of the artery. It is determined by the force, which should be exercised to compress the artery completely in order to arrest the blood flow in it. This property of the pulse gives the information about the state of the vascular system and the arterial pressure. In healthy

persons the pulse tension is satisfactory. In a tense pulse, the force of compression to arrest the pulse wave should be great *(pulsus durus),* this is a sign of hypertension of various origin or arterial sclerosis. Reduction of tension, *soft pulse (pulsus mollis)* suggests decreased arterial pressure (reduction of the heart contractile function, shock, collapse, blood loss).

Pulse filling is the amount of blood in the vessel. This property is most difficult to determine, namely according to the maximum and minimum volume of the vessel (how the diameter of the vessel changes in the period of dilation and collapse). To do this, proximal fingers on the radial artery should press the vessel gradually, the distal finger determines its maximum filling. In healthy persons the pulse is satisfactory. In reduction of the volume of circulating blood (blood loss, shock, collapse), disturbances of contractile function of the heart, the pulse filling decreases, *pulsus vacuus,* in increased volume of the circulating blood, blood filling increases, *full (strong) pulse* (pulsus plenus). Pulse filling and tension give similar information.

Pulse value is a collective concept, uniting such properties as filling and tension. It depends of the degree of the artery widening during systole and its collapse during diastole. In healthy persons the pulse is sufficient. With the increase of the stroke blood volume, great fluctuations of the arterial pressure as well as decreased tone of the arterial wall, the value increases, *pulsus magnus;* in insufficiency of the aortic valve, thyrotoxicosis, fever, the tone of the aorta wall decreases. Reduction of the stroke volume, increased tone of the arterial wall reduces the number of pulse waves, *small pulse (pulsus parvus).* This is observed in stenosis of the aorta opening, mitral stenosis, tachycardia, heart failure; in shock, massive blood loss the pulse is poorly felt, *thready pulse (pulsus filiformis).*

The shape or rate of the pulse is the rate of dilation and the following contraction of the artery. This property depends of the rate of the pressure changes in the arterial system during systole and diastole. In aortic valve incompetence, *an abrupt pulse (pulsus celer)* or *a bouncing pulse (pulsus silens)* as well as *pulsus altus:* the stroke blood volume and systolic blood pressure are increased, during diastole the pressure drops quickly as the blood returns from the aorta to the left ventricle can

be present.

Abrupt pulse is also observed in thyrotoxicosis, nervous excitement.

Slow pulse (pulsus tardus) is opposite to an *abrupt pulse.* This is associated with slow increase of the blood pressure in the arterial system and its small fluctuations during a cardiac cycle. This is observed in stenosis of the aorta opening. Due to reduction of the pulse waves it is not only slow but also small (pulsus parvus). Pulse shape disorders: a) bouncing pulsus magnus; c) slow small pulse.

Dicrotic pulse (pulsus dicroticus) is a second additional wave after reduction of a normal pulse wave. In healthy subjects it is not palpated but registered on sphygmogram. A dicrotic pulse is present in reduced tone of the peripheral arteries (fever, infections, severe pneumonia).

An alternating pulse (pulsus alterans) is alterations of large and small pulse waves when the pulse is rhythmical (severe affection of the myocardium, i.e. myocarditis, cardiomyopathy.

A paradoxical pulse (pulsus paradoxus) is reduction of the pulse waves during breathing in (in adhesion of the pericardium layers due to compression of the large veins and reduction of the heart filling during expiration.

The study of the arterial pulse allows to evaluate the contractile function of the heart, the amount of the ejected blood, the properties of the arterial wall, arterial pressure, in some cases it suggests the affections of the aorta valves, increase of the body temperature, the state of the nervous system.

In addition to arterial, capillary and venous pulses are also distinguished. *Capillary pulse* is observed in insufficiency of the aortic valve, sometimes in thyrotoxic goiter. It is determined in the following way: it necessary to press the tip of the nail until a white spit appears in the center. It will widen and narrow with each pulse beat. Similarly hyperemic spot produced by rubbing the skin (e.g. on the forehead) may widen and narrow. The pulse is termed capillary, which is not accurate, it depends on the pulse fluctuations or arteriole blood filling.

INTRODUCTION

When a person is receiving less than normal quantities of nutrient substances for whatever reason, supplements may be prescribed. Vitamins and minerals arc two substances often used therapeutically as nutrient supplements. The procedure for administering such nutrient supplements is the same as that used for administering drugs. For case of reading, the term nutrient supplements will not be repeated each time the words drug and medication are used in this chapter, although it should be recognized that these supplements arc not correctly classified as drugs.

Therapeutic agents include drugs and physiological substances used to treat pathological conditions. This chapter is concerned primarily with the nurse's responsibilities for the administration of these agents. Information about specific drugs, their actions, and pharmaceutical toxicology are more appropriately discussed in pharmacology texts.

Although many times the nurse supplies information to assist the physician to develop a therapeutic drug plan for his patients, the physician is legally responsible for prescribing therapeutic agents. He conveys directives for his plan to others by a physician's order or a prescription. Safe practice is to follow only a written order. A written order by the physician is least likely to result in error or misunderstanding. Under certain circumstances, a verbal order from the physician may be given to a registered nurse or pharmacist. The legal circumstances of dispensing and administering an agent without a written order vary, and the nurse is cautioned to be familiar with the exact agency policy wherever she is called upon to administer therapeutic agents.

Each health agency has a policy specifying the manner in which the physician writes his order. In most cases, orders are written on a form specifically intended for the physician's orders. This becomes part of the patient's permanent record or the pharmacy record.

Types of Orders. There are several types of orders that the physician may prescribe. One type is called a *standing order* and is to be carried out as specified until it is canceled by another order. Occasionally, the physician writes a standing order and its cancellation simultaneously-that is, the physician specifies that a certain order is to be carried out for a stated number of days or times. After the stated period has passed, the order is canceled automatically. Some health agencies and pharmacies have policies that specify that standing

orders must be reviewed and rewritten at regular intervals or they will be canceled.

A second type of order is called a *single order;* that is, the directive is carried out only once, either at early convenience or at a time specified by the physician. A *stat order* is also a single order, but it is one which is to be carried out at once. When a patient has had surgery or when he is transferred to another clinical service or another health agency, it is general practice that all orders related to drugs are discontinued, and new orders arc written. To keep physicians aware of order in effect, some hospitals specify a day of the week when orders are to be rewritten or they will be automatically discontinued.

It is usual hospital policy that when a patient is admitted, unless specific orders to the contrary are written, all drugs which the physician may have ordered while the patient was at home are discontinued. This may prove to be a problem when a patient brings his medications to the hospital. To avoid the possibility of having the patient continue taking his medications while receiving the same ones or others under new orders, all medications should be sent home with the family or removed from the patient's unit and placed in safekeeping. This will require an explanation to the patient and family of how the patient's drug plan will be implemented. However, in some inpatient facilities patients keep their medications at their bedside and learn or continue to administer them as home. It is felt that this approach helps to promote the independence of patients. The nurse should be aware when patients are allowed to take their own medications while hospitalized and should know the agent's purpose and possible undesirable side effects. Also, a notation should be made on the patient's plan of care so that everyone knows the patient has medications at his bedside.

Parts of the Drug Order. The drug order consists of seven parts: the name of the patient, the date the order is written, the name of the drug to be administered, the dosage, the route by which it is to be administered and special directives about its administration, the time of administration and/or frequency, and the signature of the person writing the order. Drug prescriptions to a pharmacist serving an outpatient may also specify whether or not the name of the drug should be included on the label and how many times the prescription can be refilled.

The *patient's full name* is used. The middle name or initial should be included to avoid contusion with other patients. Some health agencies have facilities to

imprint the patient's name mechanically on the order form.

The date the order is written is given. In some situation, the *time* the order is written may also be included. Since the nursing staffs in inpatient facilities change several times during each 24-hour period, the date and the time help to prevent errors of oversight as different nurses take charge of a unit. When an order is to be followed for a specified number of days, the date and the time are important in order that the discontinuation date and time can be determined accurately. Law determines the time that an order for a narcotic remains valid. Therefore, the date and the time the order was written are essential for determining when the order for a narcotic becomes invalid.

The name of the drug is stated in the order after the physician has indicated the patient for whom it is intended. Some agencies require that the physician use generic nomenclature. Certain trade names are well known, but the practice of using the official name is the safest one. If the nurse is unfamiliar with a drug, she can investigate by referring to certain standard references. In this country, *The United States Pharmacopsia* and the *National Formulary* (N.F.) are official sources. Most other countries have similar references, which describe official therapeutic agents. Many agencies also provide their own book listing the drugs commonly used by the agency. The American Society of Hospital Pharmacists and the American Medical Association's Council on Drugs also publish helpful resources for drug information. The *Physician's Desk Reference to Pharmaceutical Specialties and Biological;* (PDR), is another handy source of information. It is published by Medical Economics, Inc. from information supplied by pharmaceutical companies.

The *dosage* of a drug can be stated in either the apothecary or the metric system. With planned conversion of this country's measurements to the metric system, apothecary measurements are being used less frequently. Self-administered drugs are frequently labeled in household measurements to facilitate administration. Most agencies post a table to common equivalent dosages for persons who have learned to use one system and find that the agency in which they work uses the other system. Although these tables are convenient and useful, the nurse should be prepared to convert from one system to the other, since such tables are not available in every situation. The nurse should also be familiar with common equivalent measurements when using household equipment such as teaspoons, tablespoons, and so on, since usually the home is not equipped with special measuring devices.

Certain standard abbreviations are used to indicate drug amounts. Before a nurse can administer drugs, she will be required to acquaint herself with these common abbreviations. Weight is a factor in dosage calculation because, in general, the heavier the person, the larger the dosage of drugs he can tolerate.

The route of administration influences dosage calculations. Drugs given by mouth are adsorbed more slowly and less completely than those given intravenously. Hence, the dosage of a drug given intravenously generally is smaller than that of the same drug given orally.

The general condition of the patient and his drug intolerances are also factors that may influence dosage calculations. Age and the patient's sex may also be significant. Generally, elderly persons and women require smaller dosages than younger adults and men.

The *route* to be used when administering the medication is stated clearly because some drugs can be given in more than one way and some may be used safely only via one route. If a route is not specified, it is generally understood to be an *oral* medication; that is, it is given by mouth.

As in the case of calculating dosages, there are several factors that influence the choice of route. These include the desired action of the drug, the speed of absorption and rapidity of response, the nature of the med and the condition of the patient.

The action of drugs can be either systemic or local. A systemic action occurs when the agent is absorbed by the bloodstream and is distributed throughout the tissues and the fluids of the body. For example, an antibiotic given by injection is absorbed by the blood and acts upon certain organisms wherever they may be harboring in body tissues or fluid.

A local action occurs when the agent is placed directly in contact with tissue and it is intended to act upon that specific tissue only. One type occurs with a drug for athlete's foot where the drug acts directly upon the diseased tissue and the causative organism. Other local actions include eyedrops containing drugs which can, when instilled, either dilate or contract the pupil, and local anesthetic agents.

Eye medications

Eye medications - drops, ointments, and disks - serve diagnostic and therapeutic purposes. During an eye examination, eyedrops can be used to anesthetize the eye, dilate the pupil to facilitate examination, and stain the cornea to identify corneal

abrasions, scars, and other anomalies. Eye medications can also be used to lubricate the eye, treat certain eye conditions (such as glaucoma and infections), protect the vision of neonates, and lubricate the eye socket for insertion of a prosthetic eye.

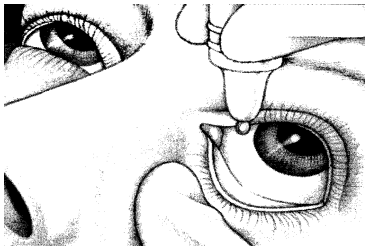
Understanding the ocular effects of medications is important because certain drugs may cause eye disorders or have serious ocular effects. For example, anticholinergics, which are often used during eye examinations, can precipitate acute glaucoma in patients with a predisposition to the disorder.

Instilling eyedrops

• Remove the dropper cap from the medication container, if necessary, and draw the medication into it. Be careful to avoid contaminating the dropper tip or bottle top.

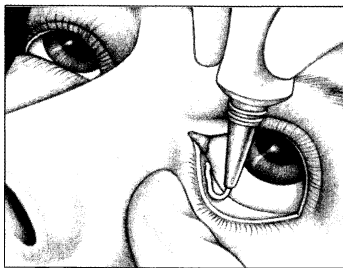
• Before instilling the eyedrops, instruct the patient to look up and away. This moves the cornea away from the lower lid and minimizes the risk of touching the cornea with the dropper if the patient blinks.

• You can steady the hand holding the dropper by resting it against the patient's forehead. Then, with your other hand, gently pull down the lower lid of the affected eye and instill the drops in the conjunctival sac. Try to avoid placing the drops directly on the eyeball to prevent the patient from experiencing discomfort.



Applying eye ointment

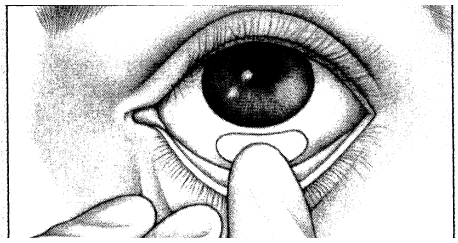
• Squeeze a small ribbon of medication on the edge of the conjunctival sac from the inner to the outer canthus. Cut off the ribbon by turning the tube. You can steady the hand holding the medication tube by bracing it against the patient's forehead or cheek.



Using a medication disk

• A medication disk can release medication in the eye for up to 1 week before needing to be replaced. Pilocarpine, for example, can be administered this way to

treat glaucoma.



After instilling eyedrops or eye ointment

• Instruct the patient to close his eyes gently, without squeezing the lids shut. If you instilled drops, tell the patient to blink. If you applied ointment, tell him to roll his eyes behind closed lids to help distribute the medication over the surface of the eyeball.

• Use a clean tissue to remove any excess solution or ointment leaking from the eye. Remember to use a fresh tissue for each eye to prevent cross-contamination.

• Apply a new eye dressing if necessary

• Return the medication to the storage area. Make sure you store it according to the label's instructions.

• Wash your hands.

Complications

Instillation of some eye medications may cause transient burning, itching, and redness. Rarely, systemic effects may also occur.

Eardrops

Eardrops may be instilled to treat infection and inflammation, produce local anesthesia, or facilitate removal of an insect trapped in the ear by immobilizing and smothering it.

Instillation of eardrops is usually contraindicated if the patient has a perforated eardrum, but it may be permitted with certain medications and adherence to sterile technique. Other conditions may also prohibit instillation of certain medications into the ear. For instance, instillation of drops containing hydrocortisone is contraindicated if the patient has herpes, another viral infection, or a fungal infection.

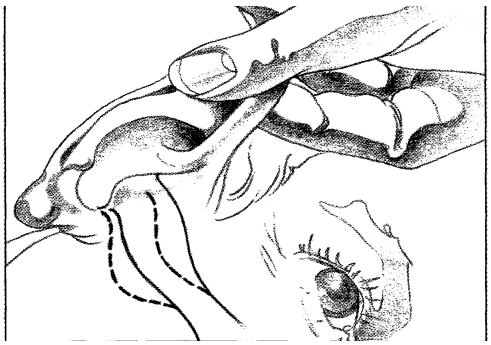
Implementation

• Wash your hands.

• Confirm the patient's identity by asking his name and checking the name, room number, and bed number on his wristband.

- Provide privacy if possible. Explain the procedure to the patient.
- Have the patient lie on the side opposite the affected ear.
- Straighten the patient's ear canal. For an adult, pull the auricle of the ear up and back.
- Using a light source, examine the ear canal for drainage. If you find any, clean the canal with the tissue or cotton-tipped applicator because drainage can reduce the medication's effectiveness.
- Compare the label on the eardrops with the order on the patient's medication record. Check the label again while drawing the medication into the dropper. Check the label for the final time before returning the eardrops to the shelf or drawer.
- To avoid damaging the ear canal with the dropper, gently support the hand holding the dropper against the patient's head. Straighten the patient's ear canal once again, and instill the ordered number of drops. To avoid patient discomfort, aim the dropper so that the drops fall against the sides of the ear canal, not on the eardrum. Hold the ear canal in position until you see the medication disappear down the canal. Then release the ear.
- Instruct the patient to remain on his side for 5 to 10 minutes to let the medication run down into the ear canal.
- If ordered, tuck the cotton ball loosely into the opening of the ear canal to prevent the medication from leaking out. Be careful not to insert it too deeply into the canal because this would prevent drainage of secretions and increase pressure on the eardrum.
- Clean and dry the outer ear.
- If ordered, repeat the procedure in the other ear after 5 to 10 minutes.
- Assist the patient into a comfortable position.
- Wash your hands.

Before instilling eardrops, have the patient lie on his side. Then straighten the patient's ear canal to help the medication reach the eardrum. For an adult gently pull the auricle *up and back.*



PARENTERAL ADMINISTRATION

Subcutaneous (S.C.) injection

When injected into the adipose (fatty) tissues beneath the skin, a drug moves into the bloodstream more rapidly than if given by mouth. Subcutaneous (S.C.) injection allows slower, more sustained drug administration than I.M. injection; it also causes minimal tissue trauma and carries little risk of striking large blood vessels and nerves.

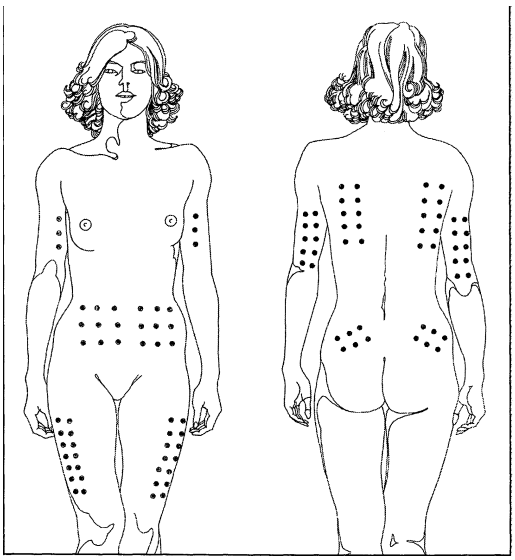
Absorbed mainly through the capillaries, drugs recommended for S.C. injection include nonirritating aqueous solutions and suspensions contained in 0.5 to 2 ml of fluid. Heparin and insulin, for example, are usually administered S.C. (Some diabetic patients, however, may benefit from an insulin infusion pump.)

Drugs and solutions for S.C. injection are injected through a relatively short needle, using meticulous sterile technique. The most common S.C. injection sites are the outer aspect of the upper arm, anterior thigh, loose tissue of the lower abdomen, upper hips, buttocks, and upper back. Injection is contra-indicated in sites that are inflamed, edematous, scarred, or covered by a mole, birthmark, or other lesion. It may also be contraindicated in patients with impaired coagulation mechanisms.

Locating subcutaneous injection sutes

Subcutaneous (S.C.) injection sites (as indicated by the dotted areas below) include the fat pads on the abdomen, upper hips, upper back, and lateral upper arms and thighs. For S.C. injections administered repeatedly, such as insulin, rotate sites. Choose one injection site in one area, move to a corresponding injection site in the next area, and so on.

When returning to an area, choose a new site in that area. Preferred injection sites for insulin are the arms, abdomen, thighs, and buttocks. The preferred injection site for heparin is the lower abdominal fat pad, just below the umbilicus.



Implementation

• Confirm the patient's identity by asking his name and checking the name, room number, and bed number on his wristband.

• Explain the procedure to the patient and provide privacy.

• Select an appropriate injection site. Rotate sites according to a schedule for repeated injections, using different areas of the body unless contraindicated. (Heparin, for example, should be injected only in the abdomen if possible.)

• Put on gloves.

• Position and drape the patient if necessary.

• Clean the injection site with an alcohol sponge, beginning at the center of the site and moving outward in a circular motion. Allow the skin to dry before injecting the drug to avoid a stinging sensation from introducing alcohol into subcutaneous tissues.

• Loosen the protective needle sheath.

• With your nondominant hand, grasp the skin around the injection site firmly to elevate the subcutaneous tissue, forming a 2.5-cm fat fold.

• Holding the syringe in your dominant hand, insert the loosened needle sheath between the fourth and fifth fingers of your other hand while still pinching the skin around the injection site. Pull back the syringe with your dominant hand to uncover the needle by grasping the syringe like a pencil. Don't touch the needle.

• Position the needle with its bevel up.

• Tell the patient he'll feel a needle prick.

• Insert the needle quickly in one motion at a 45- or 90-degree angle. Release the patient's skin to avoid injecting the drug into compressed tissue and irritating nerve fibers.

• Pull back the plunger slightly to check for blood return. If none appears, begin injecting the drug slowly. If blood appears on aspiration, withdraw the needle, prepare another syringe, and repeat the procedure.

• Don't aspirate for blood return when giving insulin or heparin. It isn't necessary with insulin and may cause a hematoma with heparin.

• After injection, remove the needle gently but quickly at the same angle used for insertion.

• Cover the site with an alcohol sponge, and massage the site gently (unless contraindicated, as with heparin and insulin) to distribute the drug and facilitate absorption.

• Remove the alcohol sponge, and check the injection site for bleeding and bruising.

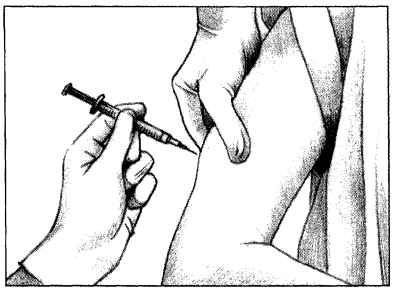
• Dispose of injection equipment according to your facility's policy. To avoid needle-stick injuries, don't resheath the needle.

Complications

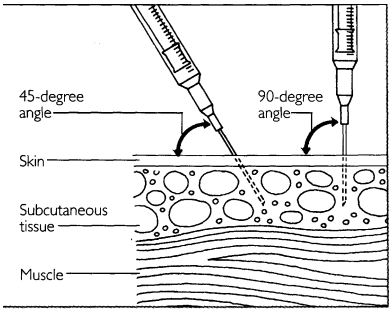
Concentrated or irritating solutions may cause sterile abscesses to form. Repeated injections in the same site can cause lipodystrophy. A natural immune response, lipodystrophy can be minimized by rotating injection sites.

Technique subcutaneous injection

Before giving the injection, elevate the subcutaneous tissue at the site by grasping it firmly.



Insert the needle at a 45- or 90-degree angle to the skin surface, depending on needle length and the amount of subcutaneous tissue at the site. Some medications, such as heparin, should always be injected at a 90-degree angle.



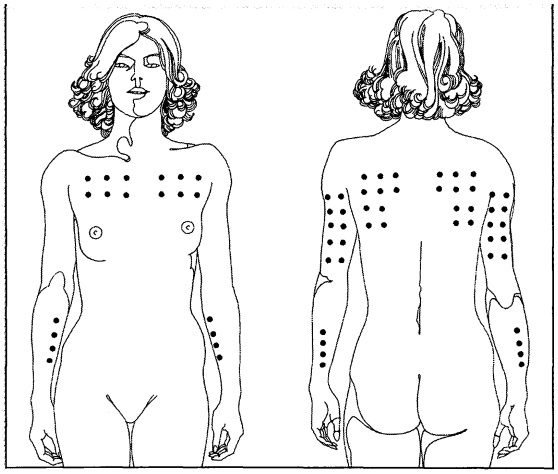
Intradermal injection

Because little systemic absorption of intradermally injected agents takes place, this type of injection is used primarily to produce a local effect, as in allergy or tuberculin testing. Intradermal injections are administered in small volumes (usually 0.5 ml or less) into the outer layers of the skin.

The ventral forearm is the most commonly used site for intradermal injection because of its easy accessibility and lack of hair. In extensive allergy testing, the outer aspect of the upper arms may be used as well as the area of the back located between the scapulae.

Intradermal injection sites

The most common intradermal injection site is the ventral forearm. Other sites (indicated by dotted areas) include the upper chest, upper arm, and shoulder blades. Skin in these areas is usually lightly pigmented, thinly keratinized, and relatively hairless, facilitating detection of adverse reactions.



Implementation

- Verify the patient's identity by asking his name and checking the name, room number, and bed number on his wristband against his medical record.
- Tell him where you'll be giving the injection.
- Instruct the patient to sit up and to extend his arm and support it on a flat surface, with the ventral forearm exposed.
- Put on gloves.
- With an alcohol sponge, clean the surface of the ventral forearm about two or three fingerbreadths distal to the antecubital space. Be sure the test site you have chosen is free of hair or blemishes. Allow the skin to dry completely before administering the injection.

• While holding the patient's forearm in your hand, stretch the skin taut with your thumb.

• With your free hand, hold the needle at a 10- to 15-degree angle to the patient's arm, with its bevel up.

• Insert the needle about 0.3 cm below the epidermis at sites 5 cm apart. Stop when the needle's bevel tip is under the skin, and inject the antigen slowly. You should feel some resistance as you do this, and a wheal should form as you inject the antigen.

• Withdraw the needle at the same angle at which it was inserted. Don't rub the site. This could irritate the underlying tissue, which may affect test results.

• Circle each test site with a marking pen, and label each site according to the recall antigen given. Instruct the patient to refrain from washing off the circles until the test is completed.

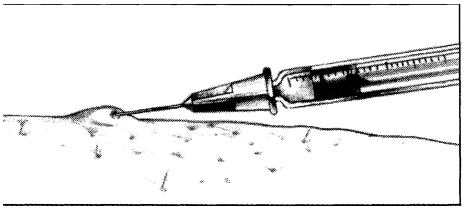
• Dispose of needles and syringes according to your facility's policy.

• Remove and discard your gloves.

• Assess the patient's response to the skin testing in 24 to 48 hours.

Giving an intradermal injection

Secure the forearm. Insert the needle at a 10- to 5-degree angle so that it just punctures the skin's surface. The antigen should raise a small wheal as it's injected.



I.M. injection

I.M. injections deposit medication deep into muscle tissue. This route of administration provides rapid systemic action and absorption of relatively large doses (up to 5 ml in appropriate sites). I.M. injections are recommended for patients who are uncooperative or can't take medication orally and for drugs that are altered by digestive juices. Because muscle tissue has few sensory nerves, I.M. injection allows less painful administration of irritating drugs.

The site for an I.M. injection must be chosen carefully, taking into account the patient's general physical status and the purpose of the injection. I.M. injections shouldn't be administered at inflamed, edematous, or irritated sites or at sites that contain moles, birthmarks, scar tissue, or other lesions. I.M. injections may also be contraindicated in patients with impaired coagulation mechanisms, occlusive

peripheral vascular disease, edema, and shock; after thrombolytic therapy; and during an acute myocardial infarction because these conditions impair peripheral absorption. I.M. injections require sterile technique to maintain the integrity of muscle tissue.

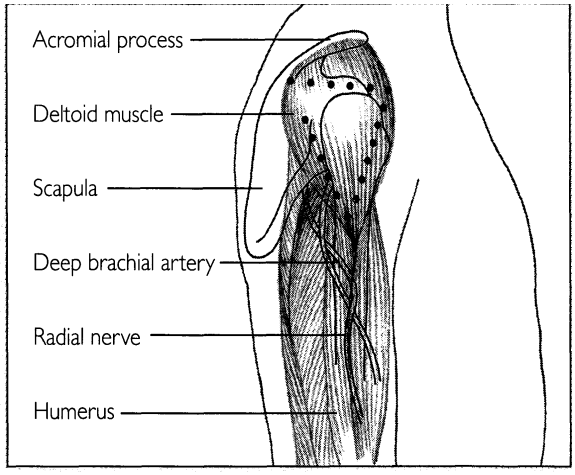
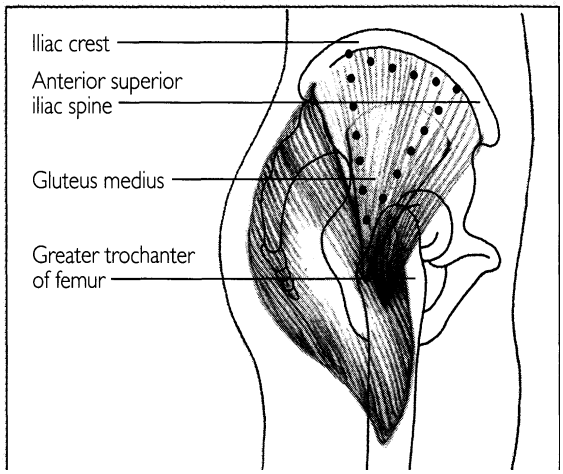
Implementation

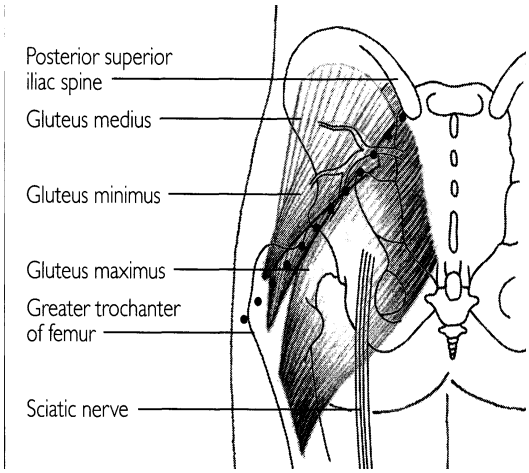
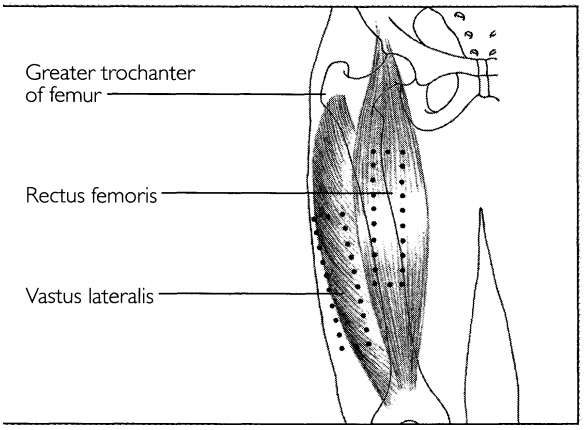
• Confirm the patient's identity by asking his name and checking his wristband for name, room number, and bed number.

• Provide privacy, explain the procedure to the patient, and wash your hands.

• Select an appropriate injection site. The gluteal muscles (gluteus medius and minimus and the upper outer corner of the gluteus maximus) are used most commonly for healthy adults, although the deltoid muscle may be used for a small-volume injection (2 ml or less). Remember to rotate injection sites for patients who require repeated injections.

Locating I.M. injection sites

<table>
<tr>
<td>Deltoid: Find the lower edge of the acromial process and the point on the lateral arm in tine with the axilla. Insert the needle 2.5 to 5 cm below the acromial process, usually two or three fingerbreadths, at a 90-degree angle or angled slightly toward the process. Typical injection: 0.5 ml (range: 0.5 to 2.0 ml).
 
</td>
<td>Ventrogluteal: Locate the greater trochanter of the femur with the heef of your hand. Then, spread your index and middle fingers from the anterior superior iliac spine to as far along the iliac crest as you can reach. Insert the needle between the two fingers at a 90-degree angle to the muscle. Typical injection: 1 to 4 ml (range: 1 to 5 ml)
 
</td>
</tr>
<tr>
<td>Dorsogluteal: Inject above and outside a line drawn from the posterior superior iliac spine to the greater</td>
<td>Vastus lateralis: Use the lateral muscle of the quadriceps group, from a handbreadth below the greater trochanter</td>
</tr>
</table>

trochanter of the femur. Or, divide the buttock into quadrants and inject in the upper outer quadrant, about 5 to 7.6 cm below the iliac crest. Insert the needle at a 90-degree angle. Typical injection: 1 to 4 ml (range: 1 to 5 ml), 	to a hand-breadth above the knee. Insert the needle into the middle third of the muscle parallel to the surface on which the patient is lying. You may have to bunch the muscle before insertion. Typical injection: 1 to 4 ml (range: 1 to 5 ml). 

• Position and drape the patient appropriately, making sure the site is well exposed and that lighting is adequate.

• Loosen the protective needle sheath, but don't remove it.

• After selecting the injection site, gently tap it to stimulate the nerve endings and minimize pain when the needle is inserted. Clean the skin at the site with an alcohol sponge. Move the sponge outward in a circular motion to a circumference of about 5 cm from the injection site, and allow the skin to dry. Keep the alcohol sponge for later use.

• Put on gloves. With the thumb and index finger of your nondominant hand, gently stretch the skin of the injection site taut.

• While you hold the syringe in your dominant hand, remove the needle sheath by slipping it between the free fingers of your nondominant hand and then drawing back the syringe.

• Position the syringe at a 90-degree angle to the skin surface, with the needle a couple of inches from the skin. Tell the patient that hell feel a prick as you insert the needle. Then quickly and firmly thrust the needle through the skin and subcutaneous tissue, deep into the muscle.

• Support the syringe with your nondominant hand, if desired. Pull back slightly on the plunger with your dominant hand to aspirate for blood. If no blood appears,

slowly inject the medication into the muscle. A slow, steady injection rate allows the muscle to distend gradually and accept the medication under minimal pressure. You should feel little or no resistance against the force of the injection.

• After the injection, gently but quickly remove the needle at a 90-degree angle.

• Using a gloved hand, cover the injection site immediately with the used alcohol sponge, apply gentle pressure, and unless contraindicated, massage the relaxed muscle to help distribute the drug.

• Remove the alcohol sponge, and inspect the injection site for signs of active bleeding or bruising. If bleeding continues, apply pressure to the site; if bruising occurs, you may apply ice.

• Watch for adverse reactions at the site for 10 to 30 minutes after the injection.

■ An older patient will probably bleed or ooze from the site after the injection because of decreased tissue elasticity. Applying a small pressure bandage maybe helpful. ■

• Discard all equipment according to standard precautions and your facility's policy. Don't recap needles; dispose of them in an appropriate sharps container to avoid needle-stick injuries.

Complications

Accidental injection of concentrated or irritating medications into subcutaneous tissue or other areas where they can't be fully absorbed can cause sterile abscesses to develop. Such abscesses result from the body's natural immune response in which phagocytes attempt to remove the foreign matter.

Failure to rotate sites in patients who require repeated injections can lead to deposits of unabsorbed medications. Such deposits can reduce the desired pharmacologic effect and may lead to abscess formation or tissue fibrosis. ■ Because older patients have decreased muscle mass, I.M. medications can be absorbed more quickly than expected. ■

I.V. therapy preparation

Selection and preparation of appropriate equipment are essential for accurate delivery of an I.V. solution. Selection of an I.V. administration set depends on the rate and type of infusion desired and the type of I.V. solution container used. Two types of drip sets are available: the macrodrip and the microdrip. The macrodrip set can deliver a solution in large quantities at rapid rates because it delivers a larger amount with each drop than the microdrip set. The microdrip set, used for pediatric patients and certain adult patients who require small or closely regulated amounts of

I.V. solution, delivers a smaller quantity with each drop.

Administration tubing with a secondary injection port permits separate or simultaneous infusion of two solutions; tubing with a piggyback port and a backcheck valve permits intermittent infusion of a secondary solution and, on its completion, a return to infusion of the primary solution. Vented I.V. tubing is selected for solutions in non-vented bottles; nonvented tubing is selected for solutions in bags or vented bottles. Assembly of I.V. equipment requires aseptic technique to prevent contamination, which can cause local or systemic infection.

Implementation

• Wash your hands thoroughly *to prevent introducing contaminants during preparation.*

• Slide the flow clamp of the administration set tubing down to the drip chamber or injection port, and close the clamp.

• Place the bag on a flat, stable surface or hang it on an I.V. pole.

• Remove the protective cap or tear the tab from the tubing insertion port.

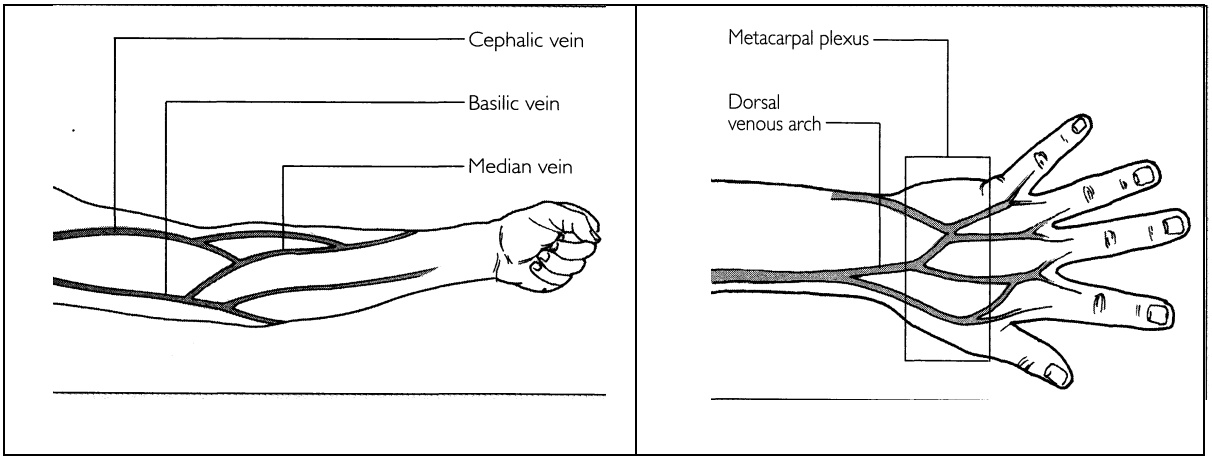
• Remove the protective cap from the administration set spike.

• Holding the port firmly with one hand, insert the spike with your other hand.

• Hang the bag on the I.V. pole, if you haven't already, and squeeze the drip chamber until it is half full.

Common venipuncture sites

The illustrations below show the anatomic locations of veins commonly used for venipuncture. The most commonly used sites are on the forearm, followed by those on the hand.



Volume-control sets

A volume-control set - an I.V. line with a graduated chamber - delivers precise amounts of fluid and shuts off when the fluid is exhausted, preventing air from entering the I.V. line. It may be used as a secondary line in adults for intermittent infusion of medication.

Implementation

• Wash your hands, and explain the procedure to the patient. If an I.V. line is already in place, observe its insertion site for signs of infiltration and infection.

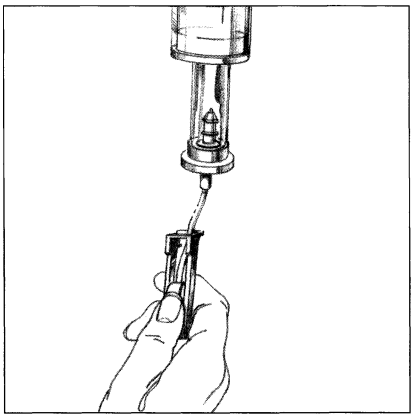
• Remove the volume-control set from its box and close all the clamps.

• Remove the protective cap from the volume-control set spike, insert the spike into the I.V. solution container, and hang the container on the I.V. pole.

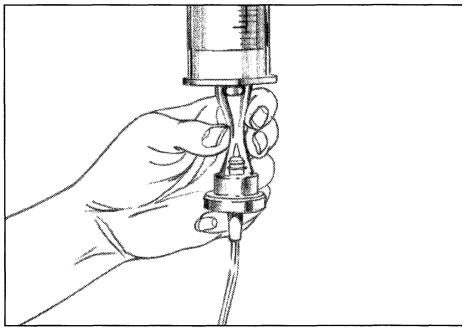
• Open the air vent clamp and close the upper slide clamp. Then open the lower clamp on the I.V. tubing, slide it upward until it's slightly below the drip chamber, and close the clamp (as shown at top of next page).

• If you're using a valve set, open the upper clamp until the fluid chamber fills with about 30 ml of solution. Then close the clamp, and carefully squeeze the drip chamber until it is half full.

• If you're using a volume-control set with a membrane filter, open the upper clamp until the fluid chamber fills with about 30 ml of solution, and then close the clamp.



• Open the lower clamp, and squeeze the drip chamber flat with two fingers of your opposite hand (as shown below). If you squeeze the drip chamber with the lower clamp closed, you'll damage the membrane filter.



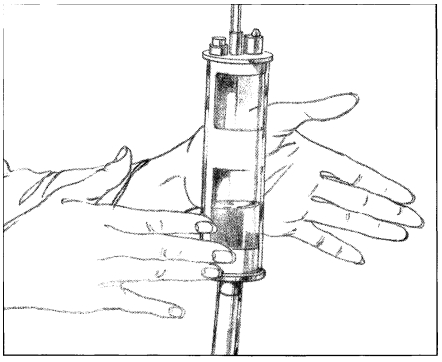
• Keeping the drip chamber flat, close the lower clamp. Now release the drip chamber so that it fills halfway.

• Open the lower clamp, prime the tubing, and close the clamp. To use the set as a primary line, insert the distal end of the tubing into the catheter or needle hub. To use the set as a secondary line, attach a needle to the adapter on the volume-control set. Wipe the Y-port of the primary tubing with an alcohol sponge, and insert the needle. Then tape the connection.

• If you're using a needle-free system, attach the distal end of the tubing to the Y-port of the primary tubing, following the manufacturer's instructions.

• To add medication, wipe the injection port on the volume-control set with an alcohol sponge and inject the medication. Place a label on the chamber, indicating the drug, dose, and date. Don't write directly on the chamber because the plastic absorbs ink.

• Open the upper clamp, fill the fluid chamber with the prescribed amount of solution, and close the clamp. Gently rotate the chamber (as shown below) to mix the medication.



• Turn off the primary solution (if present) or lower the drip rate to maintain an open line.

• Open the lower clamp on the volume-control set, and adjust the drip rate as ordered. After completion of the infusion, open the upper clamp and let 10 ml of I.V. solution flow into the chamber and through the tubing to flush them.

• If you're using the volume-control set as a secondary I.V. line, close the lower

clamp and reset the flow rate of the primary line. If you're using the set as a primary I.V. line, close the lower clamp, refill the chamber to the prescribed amount, and begin the infusion again.

Cleaning Supplies and Equipment

Proper cleaning of items used in health care prior to their being sterilized or disinfected is essential. Organisms embedded in organic material, such as blood, mucus, pus, or fecal matter, or protected under a layer of fat or grease are difficult to destroy. Furthermore, cleaning reduces the number of organisms present, and, as has been pointed out, the fewer the organisms the easier it is to sterilize or disinfect equipment.

Persons cleaning equipment should wear waterproof gloves if the articles are contaminated with highly pathogenic materials or if they have skin abrasions on their hands. A brush with stiff bristles is an important aid for cleaning equipment.

It is generally recommended that all equipment first be rinsed in cold water to remove any organic material. The protein in organic materials is coagulated by heat and, therefore, is more difficult to remove after exposure to hot water. Then, warm water containing a detergent or soap should be used to complete cleaning the items. The brush, the gloves if used, and the sink or basin in which the equipment is cleaned should be considered contaminated and treated and cleaned accordingly. After the equipment has been cleaned thoroughly, it is ready for sterilization or disinfection.

Physical Means of Sterilization and Disinfection

Physical sterilization and disinfection usually arc accomplished by using heat and radiation. Both means alter the internal functioning of the organisms. The most common methods using heat are steam under pressure, boiling water, free-flowing steam, or dry heat.

Dry heat kills organisms by an oxidation process, while moist heat coagulates protein within the cell. Sterilization and disinfection occur when heat is sufficient to destroy organisms, and, the higher the temperature, the more quickly organisms will die. Therefore, an essential factor for heat sterilization and disinfection is that equipment and supplies be exposed to the heat properly. Overloading a sterilizer or packing it in such a manner that equipment and supplies are not exposed to the heat defeats the effectiveness of the process. In the following discussion, the recommended times for sterilization and disinfection are based on the assumption

that the items are prepared properly and sterilizers loaded properly so that the contents are exposed to heat adequately.

Steam Under Pressure. Moist heat in the form of saturated steam under pressure is the most dependable and practical means known for the destruction of all forms of microbial life. Steam is water vapor, and in the saturated state it can exist only at a definite pressure corresponding to a given temperature. The amount of pressure has nothing to do with the destruction of bacteria. It is the higher temperature resulting from higher pressure that destroys bacteria.

The autoclave is a pressure steam sterilizer. Most hospitals and many clinics and offices are equipped with pressure steam sterilizers today. Texts dealing with sterilization describe their operation in detail.

Many homes today have pressure cookers that operate on the same principle as pressure steam sterilizers. Foods cooked in a pressure cooker can be prepared more quickly because of the higher temperature attained by steam under pressure. Pressure cookers can be used for sterilizing equipment in the home by placing articles for sterilization on a rack or a screen above the level of water in the cooker.

The amount of time necessary to expose equipment and supplies in a pressure steam sterilizer in order to assure sterility depends on several factors: the type of equipment or supplies to be sterilized, the manner in which they arc wrapped or packaged, the way in which the sterilizer is packed, and the temperature and the pressure maintained. It is generally recommended that saturated steam at 121° to 123°C (250 to 254°F) under 15 to 17 pounds of pressure per square inch can achieve sterilization of items in 15 to 45 minutes.

It will be recalled that the temperature and not the pressure is the factor responsible for destruction of microbes. As altitude increases, a higher pressure is needed in order to reach a specific temperature; and in mountain areas persons operating pressure steam sterilizers must take this fact into consideration in order to secure sterilization.

Steam under pressure is both efficient and economical for sterilizing items that are not damaged by high temperatures and moisture. For example, most smooth hard-surfaced objects, such as many surgical instruments, metal basins, and bedpans, can be autoclaved safely. Its primary disadvantage is that items, which are sensitive to high temperatures, such as most plastics lensed instruments, drugs, and thermometer, are damaged by steam under pressure and cannot be sterilized in this way.

Dry Heat. Dry heat is no longer recommended for general sterilization and disinfection in health agencies. There may be a few exceptions when an article must remain dry, such as some powders and laboratory supplies. Dry heat has the advantage of being harmless to objects, which are damaged, by moisture, such as the cutting edge of sharp instruments and the ground surfaces of glass. However, its disadvantage is that the penetration ability of dry heat is not believed sufficient to destroy all microorganisms and, therefore, its reliability is questionable for most health agency use.

Dry heat may be used in some home situations to achieve disinfection. A hot-air or ordinary baking oven can be used for this purpose. Authorities agree that, for most articles, disinfection occurs when a temperature of 160°C (320°F) is maintained for two hours. For equipment and supplies that will not tolerate this temperature, a longer time at a lower temperature is required.

Boiling Water. Placing equipment in boiling water for a time has been a common method of sterilization are disinfection. The advantages of this method are that it is inexpensive and simple. However, the disadvantage is that if spores are present on equipment, boiling water is not a practical method of sterilization since the temperature of the water cannot rise about 100°C. Some spores are exceedingly resistant and the tine required to kill susceptible spores is too long and too unspecific. Also, some viruses are resistant to boiling. Therefore, using boiling water is no longer recommended for sterilization because its effectiveness is too uncertain. Boiling is usually used for disinfection in homes. Although authorities differ, it is believed boiling an item for a minimum of 15 minutes can achieve disinfection.

Free-Flowing Steam. The temperature of free-flowing steam is 100°C (212° F). Therefore, free-flowing steam for disinfection should be used for the same period of time as boiling water. It is not recommended for sterilization for the same reasons that boiling water is considered inadequate for this purpose. Its primary advantage is that it is relatively inexpensive. The major disadvantage of the free-flowing steam method is that it has limited practical value because it is difficult to load a free-flowing steam chamber in such a way that all equipment is exposed fully to the steam. Therefore, it is no longer recommended for use in health agencies. In the home, ironing with steam is believed to achieve disinfection in five to ten minutes.

In the past, many hospitals installed bedpan flushers, which flushed bedpan

and urinal contents and then released free-flowing steam on the items for a period of one to two minutes. Because such mechanisms are still in use in some hospitals and were labeled as sterilizers by some manufacturers, the nurse needs to be aware of their limitations. Bedpan flushers do not render equipment sterile. Because of the short cycle of free-flowing steam, certain pathogenic viruses are not destroyed and, therefore, even disinfection of the items is highly questionable in most instances.

Radiation. Nonionizing and ionizing radiation are used for sterilization and disinfection. They cause the death of microorganisms by altering their essential metabolic processes. The most common type of nonionizing radiation is ultraviolet rays, which can be used for disinfection. While it can destroy some organisms, ultraviolet radiation has the disadvantage of having limited practical use in health agencies because of its minimum penetration ability and the need for careful control while using it. In the home natural ultraviolet rays in the form of sunlight can be used to achieve some degree of disinfection. When it is feasible to use this form of radiation, its chief advantage is that is inexpensive.

In recent years, ionizing radiation has been developed for sterilization. This method is used for pharmaceuticals, foods, plastics, and other heat-sensitive items. Its major advantage is that it is believed to be extremely effective for many items, which are otherwise difficult to sterilize. Its primary disadvantage is that the facilities and equipment for the use of ionizing radiation are complex and expensive. Therefore, it is not generally available in health care agencies but is used by commercial industries, which manufacture and sterilize prepackaged health care items and other products.

Chemical Means of Sterilization and Disinfection

Chemical sterilization employs liquid solutions or gases. Objects to be sterilized are immersed in a solution or exposed to fumes in a chamber or oven for a specified time. Various studies have found serious shortcomings in the use of chemicals for sterilization. In fact, some authorities state that no chemical solution can be considered completely safe for sterilization. Hence, the use of chemicals ordinarily is limited to items that arc heat-sensitive or to situations in which a more reliable method is not available.

A chemical commonly used for sterilization is ethylene oxide gas. The gas destroys microorganisms by interfering with metabolic processes in cells and it has been found to effect lethal action on spores as well as vegetative cells. Optimum

action can be attained at relatively low temperatures 54.4° to 65.5°C (130° to 150°F) when humidity in the sterilizer is held between approximately 30 to 60 percent. Its penetrating qualities are excellent. Although steam under pressure is the preferred sterilizing method, ethylene oxide has the advantage of being useful for sterilizing heat-sensitive items, including rubber, plastic, and paper. The major disadvantage of ethylene oxide is that it is considered to be toxic to humans in high concentrations. Therefore, it is extremely important that health personnel adhere to recommendations for adequate ventilation of the sterilizer and aeration of the sterilized materials. At the time of the preparation of this manuscript, the federal Environmental Protection Agency is reported to be considering banning the use of ethylene oxide for sterilization because of its toxicity. Nurses are encouraged to follow the development of this proposal.

Chemical disinfectants on the market arc numerous and new ones are added almost daily. One must be especially careful with substances sold as "all-purpose" disinfectants for home use. Before depending on advertisements, one should be certain that the solution has been adequately tested and is recommended for its safety and effectiveness by a reliable source.

In large health care agencies, the selection of chemical disinfectants is generally not made by the nurse, but in smaller facilities and in the home; she may be called upon to do so. When selecting a disinfectant, the nurse should follow the principles discussed in the previous section of this chapter.

Disinfectants are generally used for instrument and equipment disinfection and for housekeeping disinfection. While it was stated earlier that the term disinfectant described substances used on inanimate objects, because of their mildness, some disinfectants are also used as antiseptics on human tissue.

Disinfectants destroy organisms by disturbing their structure or their metabolic processes through coagulation and alterations of the cell membrane and cell protein. The time of exposure, concentration and temperature of the chemical, and the type of organism arc key factors in achieving disinfection. Most disinfectants are also particularly susceptible to being inactivated by the presence of various substances, such as soap and organic matter. Because of the vast number of available disinfectants and their varying uses, the reader is advised to seek information on specific disinfectants in recent chemistry and microbiology texts and current periodicals. A brief description of the major classes of disinfectants used in health settings follows.

Phenolic Compounds. Phenolic compounds are good substances for housekeeping disinfectants. Beside their bactericidal action, they have the property of stability, which means they remain active even after exposure to mild heat and prolonged drying.

Chlorine Compounds. Chlorines are useful for disinfecting water and for housekeeping disinfectants. They should not be used on metals because of their tendency to cause corrosion.

Iodine and Iodophors. Iodine has an effective bactericidal effect but also an undesirable staining quality. This characteristic is reduced when a detergent is added to the solution. The combination is distributed as iodophors. Iodophors are one of the preferred antiseptics because of their fairly rapid germicidal effect and because they are relatively nontoxic.

Formaldehyde. Aqueous solutions of formaldehyde are known as Formalin. They arc very effective bactericides. Unfortunately, however, they also have highly irritating fumes and arc toxic to human tissue. Therefore, articles disinfected in Formalin must be rinsed thoroughly before corning in contact with human tissue. Since proteins extensively inactivate formaldehyde, the removal of organic material is essential before disinfection can occur.

Alcohols. Ethyl (grain) and isopropyl (rubbing) alcohols are most commonly used as antiseptics, although occasionally they are also used as disinfectants. They act rapidly as germicidals but the effectiveness of ethyl alcohol is sometimes reduced because it is not as good a fat solvent as is isopropyl alcohol. Extensive use of the alcohols is drying to the skin and can damage plastics. However, alcohol in appropriate strength is still considered to be one of the preferred chemical disinfectants available today.

Topic 4: Medical nurse's duties to ensure diagnostic process in therapeutic hospital.

Gastposcopy

The fiberoptic scope allows direct visualization of previously inaccessible structures, and the usual endoscopic procedures can be performed more easily with less hazard and discomfort to the patient. The fiberoptic scope consists of bundles of thin, flexible, transparent fibers through which light can be transmitted to different regions of the GI tract. The light from a light source is transmitted down some of the fibers; from the illuminated area the light is then reflected back up the remaining

fibers to produce an image. The modern endoscope has a tip deflection of 180 degrees and is equipped with channels to permit the passage of biopsy forceps, cytology brushes, irrigating or injecting cannulas, snares, and/or cauteries.

Upper GI endoscopy permits visualization of all portions of the esophagus, stomach, and duodenum.

Patient preparation. The stomach must be empty for the gastroscopy to be thorough and safe. Drink and eat nothing on the day of the procedure.

Rectosigmoidoscopy

Rectosigmoidoscopy can be performed for inspection of the rectum and sigmoid colon either by the conventional rigid tube sigmoidoscope or with the new fiberoptic proctosigmoidoscope. This test is used for two major reasons: (1) The lower 15 to 18 cm of the colon is difficult to visualize radiologically, particularly the sigmoid region, but is easily seen through a sigmoidoscope. (2) The definitive diagnosis in certain conditions can be achieved through biopsy under direct visualization, which is possible with sigmoidoscopy. Ulceration is seen easily, and a biopsy is the determining factor in the differential diagnosis of many bowel disorders, particularly the different types of inflammatory bowel diseases.

Colonoscopy

Recently, with the advent of the fiberoptic scopes, it has been possible to scope the whole colon. Through colonoscopy, a physician can look inside your entire large intestine, from the lowest part, the rectum, all the way up through the colon to the lower end of the small intestine. Colonscopy, in experienced hands, is another means by which the colon can be visualized directly and a biopsy can be taken. It may also be used therapeutically for the removal of polyps of the large bowel.

Patient preparation. The colon is thoroughly cleansed by means of diet, cathartics and/or enemas. If gas or feces are still present in the large intestine at the time of the examination the procedure may have to be repeated. Hence all care should be taken to adequately prepare the patient.

Abdominal ultrasonography

Medical ultrasonography (sonography) is an ultrasound-based diagnostic imaging technique used to visualize muscles and internal organs, their size, structures and possible pathologies or lesions. In physics the term "ultrasound" applies to all acoustic energy with a frequency above human hearing (20,000 hertz or 20 kilohertz).

Typical diagnostic sonographic scanners operate in the frequency range of 2 to 18 megahertz, hundreds of times greater than this limit. The choice of frequency is a trade-off between spatial resolution of the image and imaging depth: lower frequencies produce less resolution but image deeper into the body.

In abdominal sonography, the solid organs of the abdomen such as the pancreas, aorta, inferior vena cava, liver, gall bladder, bile ducts, kidneys, and spleen are imaged. Sound waves are blocked by gas in the bowel, therefore there are limited diagnostic capabilities in this area.

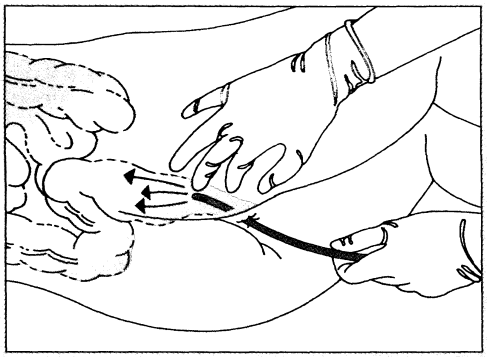
Patient preparation. Drink and eat nothing on the day of the procedure.

Enema is an introduction of a liquid in large intestines through the anus. Enema is appointed for removal of the contents of intestines, introduction of a medicine or rentgenocontrast substances (suspension of barium) at radiological research. Distinguish cleansing, purgetive, medical and drip (nutrient) enemas.

Cleansing enema is appointed at constipations, poisonings, before labors, radiological researches of organs of abdominal cavity and small (true) pelvis, application medical and nutrient enemas. These enemas are contraindicated at gastric and intestinal bleedings, ulcer processes in a large intestine and rectum, hemorrhoids, wounds of a large intestine and rectum, purulent and ulcer processes in a large intestine and anus, sharp appendicitis and a peritonitis, rectal prolapses.

For enema use pure water (1-2 l), and for amplification of the action, 2-3 dining spoons of glycerin or Vaseline oils. Temperature of water at hypokinetic constipations should be 15-20°C, at spastic - 37-39°C. In the Esmarch’s bag draw pour water of the necessary temperature and open the crane due to what the tube is filled, superseding air. After that the crane close, and a mug is hung on a support at height of 1-1,5 m.

Unless contraindicated, help the patient into the left-lateral Sims' position. After lubricating the end of the tube, separate the patient's buttocks and push the tube gently into the anus, aiming it toward the umbilicus. For an adult insert the tube 2" to 4" (5 to 10 cm). Avoid forcing the tube *to prevent rectal wall trauma.* If it doesn't advance easily, allow a little solution to flow in *to relax the inner sphincter enough to allow passage.*



If the patient complains of occurrence of a pain, it is necessary to lower a mug to reduce speed of introduction of a liquid. If a tip is obdurate with excriments, it is necessary to clean, and then to introduce it again. In those cases if excriments have been hardened, it should be taken out from a rectum with a finger or a spoon. After the ending of instillation, the tip is taken out. The entered liquid will penetrate into the top departments of a large intestine, causing amplification of peristaltics and desire to defecate. The patient should detain the entered liquid for 5-10 minutes.

Purgative enemas apply at long constipations or paresis of intestines if introduction of a plenty of a liquid is inefficient or harmful. To purgative enemas refer oil and hypertonic.

Oil enemas appoint at the expressed constipations if hardened excrement weights accumulate in a rectum, and also at inflammatory and ulcer processes in a large gut and rectum. To these enemas apply sunflower, olive and Vaseline oil, which will penetrate between walls of a gut and excriments that facilitates its conclusion. Creating weak irritation of an intestinal wall, oil assists reduction of the inflammatory processes and recovery of normal peristaltic. It is necessary to have 50-100 ml of oils of temperature 37-39C° for one enema. Oil is provided with the help of a cylinder or a Janet's syringe, pulling a rubber tip on a cylinder or a syringe. After introduction of oil the patient should lay some time. Purgetive action may come somewhere during 8-12 hours. After use, tools wash in hot water with a hydrocarbonate of sodium and boil.

Hypertonic enemas are made of 50-100 ml of 10 % solution of chloride of sodium or of 25 % solution of sulphate of magnesium. It is applied at paresis of intestines and swelling of an intestinal wall. This enema is contra-indicated at ulcer processes of large intestines, anal fissures. Hypertonic solutions enter at warm condition in the same way, as oils. After introduction of a solution, during 15-30 minutes the patient should abstain of defecation.

Medical enemas apply for introduction of medicines, mainly of local action. A

warm solution is provided in amount of 50-200 ml with the help of a balloon or a Janet's syringe with a rubber tip on depth 15-20 cm. After introduction of a solution the patient should keep it at least for 30 min. Medical enema is put in 20-30 minutes after cleansing.

Drip enemas use for introduction of a plenty (up to 2 l) of isotonic solution of chloride of sodium or 5 % of glucose for struggling against the intoxication, desiccation etc. The device for drip enemas consists of an Esmarch's mug, a rubber tube, a dropper and a tip. The speed of admission of a liquid is adjusted by a screw clip. Position of the patient during procedure is lying on a back. The mug fill with a solution of temperature 41-42°C, then fill the system of tubes and with the help of a clip adjust the speed of introduction. Then a tip is provided in a rectum on depth of 20-25 cm. During the procedure it is necessary to watch for the speed of introduction of a solution, for its temperature and its uniform admission.

Coprologycal studies

Faeces of a healthy subject consist of about equal volumes of undigested food remains, secretions of the alimentary organs and microbes. Faeces are studied to detect blood, ova of helminths, etc. General clinical analysis helps assess assimilation of food, discover disorders in the biliary secretion, latent haemorrhage, inflammation, the presence of parasites, etc. Coprology includes macroscopy, microscopy, and simple chemical analysis. Microbiological studies of faeces are necessary in cases suspected for infectious diseases of the intestine.

Faeces are collected in a dry clean container and studied as soon as possible (not later than 8-12 hours after defaecation, provided the specimen is kept in the cold). Faeces should be examined for the presence of protozoa immediately after defaecation. When faeces are examined for the degree of food assimilation, the patient is given a common diet (or a special diet for more detailed studies) several days before the study.

An important object of microscopic studies is the detection *of protozoa* and *helminths.* If ova are numerous they are found in native preparations. If their quantity is scarce, their concentration should be increased as follows. Faeces are triturated with a heavy liquid (saturated solution of sodium chloride or sodium sulphate): lighter ova float to the surface of the emulsion and are collected together with the surface film by a metal loop and are transferred to an object glass.

Ova of helminths can be isolated by precipitation. To that end an aqueous emulsion of faeces is passed through a gauze to separate it from large particles; the liquid is allowed to stand; then it is decanted and the precipitate is used to prepare the material for microscopy. Telemann's method is more effective. The procedure is essentially the same except that hydrochloric acid and ether are used instead of water: most of the undigested food is decomposed. Ova are precipitated by centrifuging. Acan-thocephala ova are detected in the material scraped from the perianal folds using a spatula or a cotton wool tampon wetted with glycerin.

The presence of blood in faeces is of great diagnostic importance since it indicates ulcer or newgrowth of the gastro-intestinal tract. The colour of faeces changes only in profuse haemorrhage. Scant blood, or its latent presence can be determined by chemical analysis. In order to identify haemorrhage as a gastro-intestinal one, it is necessary to rule out other possible sources of bleeding, e.g. nose, gums, oesophagus, haemorroids, etc. and also foods containing blood, e.g. meat and fish which should be excluded from the diet three days before the analysis. Tests for iron are impracticable with determination of blood in faeces because iron can be taken with food or medicine. Methods used for the purpose are based on the property of haemoglobin to catalyse oxidationreduction reactions. Pairs of oxidants and reductants are so selected that reactions between them only occur in the presence of haemoglobin (catalyst). Hydrogen peroxide is an oxidant and benzidine a reductant in the Gregersen test. Benzidine changes its colour on oxidation in the presence of blood. There exists a simple modification of this sensitive test. Undiluted faeces are applied in a thin layer to an object glass, which is then placed in a Petri dish on a sheet of white paper. The Gregersen reagent is placed in drops on the smear. (The reagent is prepared extemporarily by mixing equal quantities of a 1 per cent benzidine solution and 50 per cent acetic acid in hydrogen peroxide.) In the presence of blood, a green or blue colour develops, whose brightness and the speed of development depend on the amount of the blood present (the higher the blood content, the brighter the colour and the sooner it appears).

Urinalysis

The urine examination, properly performed, may give valuable information. The urine that is to be analyzed should be a clean catch (midstream) specimen collected in a clean, dry container and examined as quickly as possible, preferably within 2 hours. It should be a morning specimen and the patient should not have had

fluids for 12 hours preceding the collection of the urine. Urine becomes alkaline on standing, bacteria multiply, and leukocytes and casts disintegrate.

The standard urinalysis includes pH, specific gravity, the presence or absence of glucose and ketones, protein semiquantitation, and microscopic examination of the centrifuged urinary sediment.

Zimnitsky's test. The main advantage of this method is that the renal function is tested without interfering with the normal life of the patient. The patient collects his urine at 3-hour intervals (8 portions during 24 hours). The volume of each portion and specific gravity of the urine are determined. The volumes of daily and night urine are compared and a conclusion is derived concerning daily and nocturnal diuresis. Fluctuations in specific gravity of the urine during the course of the day and its maximum value are thus determined. Normally the daily diuresis exceeds the nocturnal one; volumes of urine portions can vary from 50 to 250 ml, and their specific gravity from 1,005 to 1,028. Nocturnal diuresis (nycturia) prevails in renal insufficiency to indicate longer work of the kidneys because of their impaired functional capacity. If renal insufficiency is pronounced, decreased specific gravity becomes permanent (hyposthenuria). Combination of polyuria with low specific gravity of the urine and nycturia is a specific sign of renal dysfunction.

Nechiporenko's method is now widely used to count erythrocytes and leucocytes in 1 ml of urine. The main advantage of this method is that an average sample of urine is taken for analysis and the presence of pus from the sex organs is thus excluded. A disadvantage of the method is that it does not account for diuresis. The normal counts are 1000 erythrocytes, 4000 leucocytes, and 220 hyaline casts.

Addis-Kakovsky test. The test is used for quantitative determination of the formed elements in the urinary sediment. Urine collected during ten hours is stirred thoroughly, its amount is measured and a 12-minute aliquot (l/50th of the full volume) is placed in a graduated centrifugal test tube. After centrifuging for 5 minutes at 2000 rpm the supernatant is removed by a pipette, while the remaining 0,5 ml sediment is stirred and transferred into a cell for counting blood formed elements. Leucocytes, erythrocytes, and casts are counted separately. The quantity of cells counted in one microlitre is multiplied by 60 000 to find the quantity of the formed cells of the urine excreted during the day. The normal counts are 1 000 000 for erythrocytes, 2 000 000 for leucocytes, and 20 000 for casts.

Gastric juice examination

The gastric juice is secreted by the gastric glands in the walls of the stomach.

Gastric juice is normally clear, pale yellow, and of high acidity with a pH of about 1.0. It is 97% to 99% water, 0.2% to 0.5% HCl, with the remainder consisting of mucin, electrolytes, and pepsin.

Stimuli for gastric secretion are divided into three phases: cephalic (psychic), gastric, and intestinal. When no stimuli are present, gastric secretion still occurs and is termed "basal."

Cephalic stimulation results from the sight, smell, taste, or thought of food. Vagal impulses will then directly stimulate the parietal cells to secrete HCl and the mucosa of the antrum to secrete the hormone gastrin.

In the gastric phase partially digested protein and the distention of the antrum stimulate the release of gastrin. Gastrin is absorbed into the blood and carried back to the stomach to potently stimulate gastric acid secretion. It also moderately stimulates pepsinogen secretion and gastric and intestinal motility, as well as enhances sphincter mechanisms of the esophagus. When the pH of the gastric juice reaches 2.0, gastrin secretion usually stops.

The intestinal phase appears to be a more complex mechanism involving the release of intestinal gastrin and the inhibition of gastric secretion by various other hormones when fats and carbohydrates are in the small intestine.

Laboratory tests for gastric acid analysis

Basal secretion

The basal secretion rate is determined to ascertain how much acid the patient secretes without stimulation to do so. The patient is intubated under fiuoroscopic visualization. The gastric contents are then aspirated continuously for 2 hours, with the aspirate titrated at half-hour intervals. Normal basal acid output (BAO) 0-6 mEq/hr. A secretion of 6 mEq or more per hour is indicative of hypersecretion. A secretion of 15 mEq or more should lead one to suspect a hormonal abnormality affecting the parietal cells.

Augmented histamine or Histalog test

This gastric secretion stimulation test should immediately follow the basal secretion test, since the capacity of the gastric cells to secrete, on a particular occasion, may not be significant in the basal state. With this stimulus (i.e., histamine or Histalog injection), a secretion of 50 mEq/hr or more indicates hypersecretion. The specimens are collected as in the basal state. This is a useful test to confirm the achlorhydria of pernicious anemia and in the diagnosis of the Zollinger-Ellison syndrome.

Duodenal intubation

Duodenal contents are studied for determining the bile composition, which in turn is necessary to diagnose affections of the gall bladder and bile ducts, and also to estimate the function of the pancreas.

Technique. Duodenal contents are obtained by probing the duodenum by an elastic rubber tube 3-5 mm in diameter. The oval bulb at the end of the tube opens into its lumen. The overall length of the tube is about 150 cm. The tube bears a mark at a distance of 45 cm from its distal end (the distance to the stomach); next marks follow at 70 and 80 cm lengths.

The procedure is carried out on a fasting stomach. The patient sits with the mouth slightly open. The tube is placed in the mouth so that the bulb is at the root of the tongue and the patient is asked to make swallowing movements. The operator should only slightly promote the independent movement of the tube. If the patient attempts to vomit, he is recommended to breathe deeply through the nose. In rare cases the throat and the upper esophagus are anaesthetized. When, according to the marks, the tube reaches the stomach, its position is verified by aspiring the stomach contents with a syringe which is inserted into the outer end of the tube: extraction of a slightly turbid acid fluid shows that the tube is inside the stomach. The fluid may be colored yellow by the duodenal contents, but the reaction remains acid. The patient is now placed on his right side so that the tube bulb would be directed (by gravity) toward the pylorus. A soft pad is placed under the patient's pelvis. The patient continues swallowing the tube to the mark of 70 cm. Breathing should be through the mouth. The tube end passes the pylorus and enters the duodenum in about 60-90 minutes (sometimes even later). The outer end of the tube is lowered into a test tube in the stand placed on a low stool at the head-end of the bed. Sometimes the tube passes the pylorus in a shorter time if the patient walks slowly about for 15-20 minutes and continues the swallowing movements. When the tube is swallowed to the mark of 70 cm, the patient lies on his right side. If the bulb has reached the duodenum, yellow alkaline fluid is gathered in the test tube. If the common bile duct is obstructed (pronounced jaundice) the duodenal contents are colorless and the reaction is alkaline. In order to check the position of the tube end (if no juice is discharged from the probe) air can be forced into the tube by a syringe. If the probe is inside the stomach, the patient feels the stream of the injected air, and bubbling can be heard. If the tube is in the duodenum, the patient does not feel anything and no sounds are heard. X-rays can most

accurately establish the position of the tube. The correct position of the tube bulb is between the descending and the lower horizontal portions of the duodenum. If the tube is stopped before the pylorus, the patient is given to drink a warm solution (2-3 g) of sodium hydrocarbonate in 10 ml of water.

The normal duodenal contents discharged from the tube *(the first phase* of examination) are golden-yellow, slightly viscous, clear, and opalescing. If it contains gastric juice, it becomes turbid from precipitating bile acids and cholesterol. The letter A designates this portion. This is a mixture of bile, pancreatic and intestinal secretion. Their proportion in the mixture is unknown and the diagnostic value of this fluid is therefore low. Bile A is collected for 10-20 minutes. An agent stimulating contraction of the gall bladder is then given through the tube. This is usually a warm solution of magnesium sulphate (25-50 ml of 25-33 per cent solution). Less frequently this is vegetable oil, egg yellow, 10 per cent sodium chloride solution, 30-40 ml of a 40 per cent glucose solution or 40 per cent sorbitol solution, and also hormones (cholecystokinin or pituitrin) which are given subcutaneously.

Following the administration of the stimulant into the duodenum, the Oddi sphincter contracts and excretion of bile is discontinued. This is the *second phase.* Normally it continues 4-6 minutes following the administration of magnesium sulphate and about 10 minutes after administration of olive oil. The phase is elongated if the tone of the Oddi sphincter is increased and shortened in its hypotonia. Next follows the *third phase,* the excretion of golden-yellow contents of the bile duct and the neck of the gall bladder (portion A). *The fourth phase* is evacuation of the gall bladder, which is attended by discharge of thicker dark-yellow, brown or olive bile. It is greenish when congested or if the gall bladder is inflamed. Portion B is the bile of the gall bladder, whose secretion is associated with positive Meltzer-Lyon reflex: contraction of the gall bladder concurrent with relaxation of the bladder sphincter and Oddi sphincter. Bladder bile (B bile) is a kind of concentrated liver bile. The wall of the gall bladder has selective absorbability: the sodium ion and water are absorbed especially actively. Ions of potassium, calcium, and chlorine are absorbed much slower. As a result, the content of bile acids and their salts increases 5-8 times, and that of bilirubin and cholesterol 10 times compared with their content in the hepatic bile (C bile). Epithelium of the gall bladder secretes mucin whose concentration in B bile is from 1 to 4 per cent. In accordance with the capacity of the gall bladder, the amount of secreted B bile is 30-60 ml during 20-30 minutes. The bladder reflex may sometimes be absent in healthy

subjects after administration of magnesium sulphate, but it usually appears in repeated examinations, or after giving vegetable oil, pituitrin, or atropine (subcutaneously). The appearance of the reflex after giving procaine or atropine indicates spasm of the sphincter and the absence of organic obstacles. Persistent absence of the bladder reflex is observed in cholelithiasis, cirrhosis of the gall bladder, obstruction of the bile duct with a stone or an inflammatory process in its mucosa, in contractile dysfunction of the gall bladder, etc. Excretion of very thick dark bile or ample amounts of bile indicates its congestion in dyskinesia of the bile ducts. Intensification of color alone indicates haemolysis (excess secretion of bilirubin).

After B bile excretion discontinues, C bile (hepatic bile) is delivered from the tube. This is the *fifth phase* of the examination. The golden yellow C bile is considered to be hepatic though it also contains admixtures of duodenal juice. Five-minute portions are collected separately during the entire examination. This fractional duodenal probing is used to determine the properties of the contents, volumes of separate portions of the bile system, and the tone of its sphincters. All the three portions of bile are studied by microscopic, chemical and sometimes bacteriological methods.

Gastric Lavage - involves passing a large tube into the stomach to wash out the stomach.

To remove unabsorbed poison after poison ingestion (may be done anytime within 3 hours after ingestion of poison; up to 10 hours with salicylate ingestion). Gastric lavage is dangerous after ingestion of strong corrosive agents (lye, ammonia, mineral acids).

Preparatory Phase

1. Give patient a glass of water to drink if he is conscious.
2. Remove dentures.
3. Lubricate tube with water-soluble lubricant.

Performance Phase

1. Measure the distance between the bridge of the nose and the xiphoid process. Mark with indelible pencil or tape.
2. If the patient is comatose he is intubated with a cuffed endotracheal tube.
3. Place the patient in a supine Trendelenburg position. *Have standby suction available.*

4. Pass the tube via the nasal route while keeping the head in a neutral position. Pass the tube to adhesive marking (about 50 cm. or 20 inches).
5. Submerge free end of tube below water level at moment of patient's exhalation.
6. Aspirate stomach with syringe attached to the tube before instilling water or antidote. Save the specimen.
7. Remove syringe. Attach funnel to the stomach tube or use 50-ml syringe to put water in gastric tube.
8. Elevate funnel above patient's head and pour 120-500 ml of water or antidote into funnel. Avoid overfilling stomach.
9. Lower the funnel and siphon gastric contents into bucket.
10. Save samples of first 2 washings.
11. Repeat lavage (washing) procedure for 10-15 times or until returns are clear. (1-2 liters).
12. At completion of lavage:
    a. Stomach may be left empty.
    b. Antidote may be instilled in tube and allowed to remain in stomach.
    c. Cathartic (saline) may be put down tube.
13. Pinch off tube during removal or maintain suction while tube is being withdrawn.

Electrocardiography

Electrocardiography is a method of graphic recording of electric curents generated in the working heart. Contractions of the heart are preceded by its excitation during which physicochemical properties of cell memranes change along with changes in the ionic composition of the in cellular and intracellular fluid, which is accompanied by generation of ectric current.

A modern electrocardiograph is actually a voltage measuring instrument, includes the following parts: the sensitive elements, electrodes, which are attached to the body of the patient to pick up the potential differences that arise during excitation of the heart muscle, and lead wires; amplifiers, which amplify the minutest voltage of e.m.f. (1-2 mV) the level that can be recorded; a galvanometer to measure the voltage; a recording inurnment, including a traction mechanism and a time marker; and a power unit (the instrument is supplied either from the AC mains or a battery).

Twelve-lead ECG recording has gained wide use the three standard leads (classical), six chest, and three unipolar limb leads. Special leads are also used in some cases.

Moist cloths are placed on the lower third of both arms and the left leg, upon

which the electrode plates are then placed. The electrodes are connected to the apparatus by special wires (different in colors). The red wire with one ring is connected to the electrode on the right arm and yellow wire with two rings to the left arm electrode, and a green wire with three rings to the left leg. Three bipolar limb leads are distinguished: I, II, and III. Lead I ECG is recorded with the electrodes placed on the arms, in lead II the ECG is taken from the right arm and left leg and in lead III from the left arm and the left leg. These leads are called bipolar because two electrodes are used to record the potentials of the corresponding parts of the body. ECG taken with bipolar limb leads is the resultant of the potential difference between two points of the body. The limbs themselves act as conductors and have but little effect on the ECG.

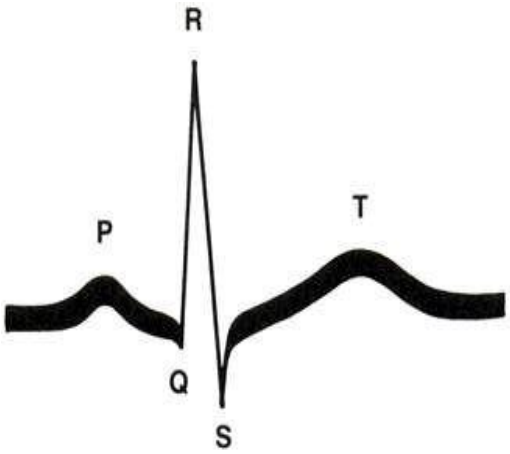
For a more accurate diagnosis of various myocardial affections, ECG is recorded with leads placed on the anterior surface of the chest. The electrode is placed successively at 6 positions: V_1 - right sternal border, the 4th intercostal space; V_2 - left sternal border, the 4th interspace; V_3 - left parasternal line, between the 4th and 5th interspace; V_4 - left midclavicular line, the 5th interspace; V_5 - left anterior axillary line, the 5th interspace; V_6 - left midaxillary line, the 5th interspace. Unipolar chest leads proposed by Wilson are more popular now. The chest electrode, which is attached to the positive pole of the electrocardiograph is only active; the electrodes leading from the limbs are united and connected to the negative terminal of the apparatus. With this connection, the total potential difference recorded from the limbs is practically zero. Unipolar chest leads are designated by the letter V and the position of the chest electrode is subscribed to give V_1, V_2, etc.

Unipolar limb leads differ from bipolar limb leads in that the potential difference in them is recorded mostly by one electrode, i.e. the active electrode, which is placed successively on the right arm, left leg, and left arm. The other electrode (as that for recording chest leads) is formed by connecting together three limb electrodes; it is indifferent. Voltage of thus recorded ECG is very small and electrocardiograms are difficult to interpret. The following leads are distinguished. Right arm lead - aVR: the active electrode is located on the right arm; left arm lead (aVL) is recorded by placing the active exploring electrode on the left arm; left leg lead (aVF) is recorded by placing the active electrode on the left leg.

Normal ECG. During diastole the heart does not generate current and in electrocardiograph records a straight line, which is called isoelectrical. Action current is represented by a specific curve. An ECG of a healthy object has the following

elements: positive waves **P, R,** and **T,** negative raves **Q** and **S**; the positive wave **U** is accidental; **P-Q, S-T, T-P** and **R-R** intervals; **QRS** and **QRST** complexes. Each of these elements characterizes the time and sequence of excitation of various parts of the myocardium.

The P wave - begins in the SA node and can be thought of as representing the cardiac electrical impulse traveling through the atria. QRS complex-represents the impulse going through the ventricles. It begins in the AV node which lies atop the ventricular chambers. T wave-does not represent an impulse going through any specific chamber but is a pure electrical phenomenon and signifies recovery of the electrical forces (repolarization).



P Wave

1. P wave represents the atrial contraction.
2. Enlargement of the P-wave deflection indicates enlargement of the atrium as might occur mitral stenosis.
3. P wave is considered enlarged if it is over 3 mm. tall or 0.12 second wid

PQ Intemal

1. Starts at the beginning of the P wave and extends to the onset of the Q wave.
2. At normal rates, the PR interval should not exceed 0.20 second.
3. This interval increases in length in AV bloc.

The QRS Complex

1. Q wave (first downwards stroke)-when it becomes large it is indicative of an old myocardial infarction.

2. The R wave (first upward deflection)

a. Becomes increased in amplitude when the ventricle enlarges as occurs in most types of heart diseases.

b. May become small when the heart is compressed by fluid as in a pericardial effusion.

The ST Segment

1. Begins at the end of the S wave (the first downwards deflection after the R wave) and terminates at the beginning of the T wave.

2. Is elevated above the base line on the ECG strip in an acute myocardial infarction or in pericarditis.

3. Becomes depressed when the heart muscle is getting a decreased supply of oxygen or when the ventricle enlarges.

4. Becomes long in hypocalcemia.

5. Becomes shorter in hypercalcemia, which is most commonly seen in metastatic carcinoma because the tumor erodes the bones and spills calcium into the serum.

The T Wave

1. Represents no cardiac activity, but reflects the electrical recovery of the ventricle contraction.

2. Is flat when the heart is not receiving enough oxygen (arteriosclerotic heart disease).

3. May be inverted in the ventricle enlarges.

4. May be made tall by air elevated serum potassium.

5. Should not be over 10 mm. high in the precordial leads (those that are placed on the chest) and should not be over 5 mm in the remaining leads.

ECHOCARDIOGRAPHY

It is sensitive method for determination of

- Size of all four chambers of heart
- Left ventricular function (ejection fraction)
- Regional wall abnormalities e.g. myocardial infarction
- Structural valve abnormalities e.g. stenosis and regurgitation
- Ischemia and myocardial infarction
- Cardiac output
- Pericardial effusion
- Atrial and ventricular septal defects

Types of echocardlography

Two-dimensional real time echocardiography This type of echocardiography is particularly valuable for detecting intracardiac masses, such as thrombi and tumors or

endocarditic vegetations. It is also helpful in detecting congenital heart diseases. Now the use of exercise echocardiography is increasing in which echo is done during exercise or just after the exercise, demonstrating exercise-induced segmental wall motion abnormalities an indicator of ischemia.

M-mode echocardiography

This type of echocardiography is particularly useful for accurate timing of cardiac events such as opening and closing of valves.

Transesophageal echocardiography

In this technique an ultrasound probe, in the shape of endoscope is passed into the esophagus and positioned behind the heart. It is very helpful in detecting very small vegetations and ASD not detected by transthoracic echocardiography.

Doppler echocardiography

Doppler echocardiography is valuable in detecting abnormal directions of blood flow e.g. aortic or mitral regurgitation and estimation of pressure gradient e.g. gradient across a stenosed aortic valve.

PULMONARY FUNCTION TESTS (PFTs)

Measurement of ventilatory capacity

- The patient is asked to take in as deep as possible and then expel it as hard and as fast as possible. If the forced expiration is made into a recording spirometer, the forced expiration volume in the standard time of 1 second (FEV_1) can be measured.
- Now measure die volume of gas that can be forcefully expelled from the lungs after maximum inspiration i.e. forced vital capacity (FVC).
- The ratio of these two volumes may be expressed as a percentage (FEV_1/VC %). Normal person can expel between 65 to 85% of the VC in 1 second.

In obstructive lung disease e.g. asthma and COPD, this ratio is reduced. It means in given time (1sec) rate of pulmonary airflow becomes reduced. Now decide whether the obstructive pattern is reversible as in asthma or irreversible as in COPD. Give bronchodilater inhaler, if there is improvement in FEV_1 after 10-20 min more than 15%, it indicates asthma. In COPD there is usually no or little improvement.

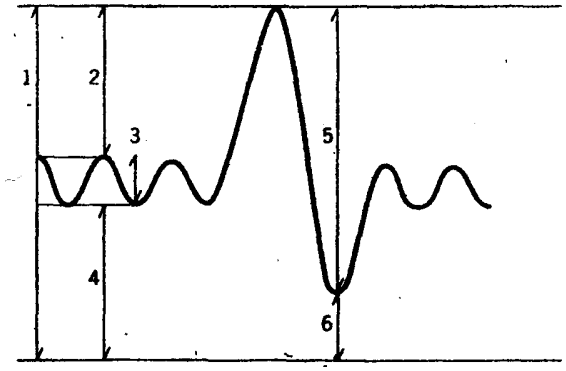
In restrictive lung disease e.g. interstitial lung disease, FEV_1 and VC are reduced in the same proportion and the ratio remains normal.

The test describes whether the disease is obstructive or restrictive. Benefit of this diagnosis is that obstructive pulmonary disease can be reversed by bronchodilators.

SPIROMETRY

The spirometer measures the forced expiratory volume in one second (FEV_1) and the forced vital capacity (FVC). The technique involves a maximum inspiration followed by a forced expiration into the spirometer. The act of expiration triggers recording of chart, which measures volume against time.

1 Total lung capacity
2 Inspiratory reserve volume
3 Tidal volume
4 Functional residual capacity
5 Vital capacity
6 Residual volume



Definitions of pulmonary function tests

Tests determed from spirometry	Definitions
Forced vital capacity (FVC)	The volume of gas that can be forcefully expelled from the lungs after maximal inspiration.
Forced expiratory volume in 1 second (FEV_1)	The volume of gas expelled in the first second of the FVC maneuver.
Peak expiratory flow rate (PEFR)	The maximal airflow rate achieved in the FVC maneuver.
Maximum ventilation volume (MVV)	The maximum volume of gas that can be breathed in 1 minute (Usually measured for 15 seconds and multiplied by 4).
Total lung capacity (TLC)	The volume of gas in the lungs after maximal inspiration.
Functional residual capacity (FRC)	The volume of gas in the lungs at the end of a normal tidal expiration.
Expiratory reserve volume (ERV)	The volume of gas representing the difference between functional residual capacity and residual volume.
Residual volume (RV)	The volume of gas remaining in the lungs after maximal expiration.

Peak Expiratory Flow Rate (PEFR)

This is an extremely simple and cheap test. It describes maximal airflow rate in a given time. Patient is asked to take a full inspiration to total lung capacity and then blow out forcefully into the peak flow meter, which is held horizontally.

Normal person can empty their chest from full inspiration in 4 sec or less, prolongation of the forced expiratory time to more than 6 sec indicates airflow obstruction. Peak flow meter is best for monitoring the progression of disease, patient can assess his airflow limitation at home and can take treatment accordingly.

Phonocardiography

This is the method for recording sounds generated in the beating heart. Phonocardiography is an essential supplement to heart auscultation because it can record sounds otherwise inaudible to the human ear, such as the third and fourth heart sounds, low-frequency components of the first and the second heart sounds, and low-frequency murmurs.

Sounds generated in the heart are recorded on a phonogram as a curve (PCG) by an apparatus known as a phonocardiograph. It consists of a microphone, an amplifier, a system of sound filters, and a recording device. The microphone picks up sounds and converts them into electrical signals. These are amplified and transmitted into the system of sound filters where the sounds are separated by their frequencies (low, medium-and high-frequency sounds) for their separate recording. Phonocardiograms should be analysed and diagnosis established only by interpreting the phonocardiogram together with the auscultation findings. For a better interpretation of phonocardiograms, an electrocardiogram should be taken synchronously.

A normal phonocardiogram gives a graphic picture of vibrations caused by the first and second heart sounds, with a straight line in between, corresponding to the systolic and diastolic pauses. The first sound is represented as several vibrations arising after the Q wave synchronously with the ECG (70-150 Hz). The initial vibrations of the first sound have low amplitude; these are connected with atrial systole. The main or central part of the first sound is shown in the form of 2-3 vibrations of high amplitude, which a found at the level of the S wave and correspond to vibrations of closed atrioventricular valves. The main portion of the first sound is followed by additional vibrations of lower amplitude which are caused by vibrations of the myocardium and by the vascular component.

The amplitude of sound waves on a PCG depends not only on the work of the heart but also on the conditions of sound conduction (for example, the amplitude decreases in patients with obesity or lung emphysema).

The amplitude of the first sound is the highest at the heart apex, where the exceeds 1,5-2 times the amplitude of the second sound. The amplitude if the first sound at the heart base can be very small. While interpreting his sound at the heart apex, it is necessary to determine the lag of its central portion from the Q wave on a synchronously recorded ECG. The normal Q-I sound interval does not exceed 0,04-0,06s. It corresponds to the me lasting from the beginning of ventricular excitation to the closure of the mitral valve. If pressure in the left atrium increases (e.g. in mitral stenosis), the mitral valve closes with a delay and the Q-I sound interval increases.

The second sound is composed of several vibrations which appear at the end of the T wave synchronous with ECG. Its frequency varies from 70 to 150 Hz. Higher amplitude corresponds to the closure of the aortic valve, while subsequent lower amplitude corresponds to the closure of the valve if the pulmonary trunk. The amplitude of the second sound is the highest it the base of the heart, where it exceeds the amplitude of the first sound.

In addition to the first and second sounds, a phonocardiogram often has the third heart sound, which is recorded as two or three low-frequency waves of small amplitude. They follow the second sound in 0,12-0,18s and appear before the P wave of a synchronous ECG. The fourth heart found is recorded less frequently. It has the form of one or two low-frequency low-amplitude waves appearing after the P wave.

Phonocardiography is very helpful in interpreting the character of heart murmurs; PCG determines the time of appearance of murmur, site of its maximum intensity, length, and frequency (which is determined mainly by the sound intensity as recorded in the high- or low-frequency channel). The frequency of systolic sound usually varies from 50 to 600 Hz and of diastolic from 120 to 800 Hz. Murmurs are shown on a PCG as a group of oscillations of various amplitude (depending on the murmur intensity) which appear during the systolic or diastolic pause.

Topic 4. Features of the procedure cabinet in therapeutic department and responsibilities of the medical nurse in order to provide them.

Therapeutic Applications of Cold.

As is true when heat is being applied, no optimum temperature can be stated for cold applications. The selection of temperature depends on such factors as duration of application, method of application, condition of the patient, condition and sensitivity of the skin, area to be covered, and so on. For short periods and for small areas, colder temperatures can be tolerated without discomfort or tissue damage. For longer periods, usually it is considered dangerous to keep skin temperatures below approximately 4.4° C. (40° F) except when ice is used for anesthesia. The temperature of water used for cold applications usually is described as tepid - 26 to 34°C, cool - 18 to 26°C, cold - 10 to 18°C, or very cold - below 13°C.

Cold compress is several layers of moist absorbent cloth or gauze folded to cover a small area. Moist, cold, local applications usually are called cold compresses. They might be used for an injured eye, headache, tooth extraction, and in some situations, for hemorrhoids**.** The texture and the thickness of the material used will depend on the area to which it is to be applied. For example, eye compresses could be prepared from surgical gauze compresses, which have a small amount of cotton filling. A washcloth makes an excellent compress for the head or the face. The material used for the application is immersed in a clean basin, appropriate for the size of the compress, that contains pieces of ice and a small amount of water. The compress should be wrung thoroughly before it is applied to avoid dripping, which is uncomfortable for the patient and may also wet the bed or clothing. The compresses should be changed frequently. Usually, the patient can feel when they have become warm, and many patient like to apply their own compresses. The application should be continued for 15 to 20 minutes and repeated every two to three hours.

Therapeutic Applications of Heat.

The optimum temperature for applying local hot applications cannot be stated. As has been pointed out, the condition of the skin, the size of the area being covered, the duration of the application, the method of applying heat (moist or dry), the condition of the patient, and the differences in heat tolerances need to be considered when determining optimum temperatures for applying heat. When the temperature of the skin surpasses approximately 43°C (110°F), many individuals are likely to suffer burns.

The temperature of water used for applications is described usually as neutral or warm, hot, and very hot. The temperature ranges stated frequently are as

follows:

Warm or neutral	Approximately 34° to 37°C (93° to 98°F)
Hot	Approximately 37° to 41°C (98° to 105°F)
Very hot	Approximately 41° to 46°C (105° to 115°F)

Effects of Very Hot Applications. If very hot applications are applied to the skin for short periods, the reaction is similar to that of cold; that is, the cutaneous vessels may contract and decrease the blood supply. The reason is that the body is protecting itself against excessive loss of internal heat when exposed to an extreme of temperature in the environment. Muscles may tail to relax. Warm applications, on the other hand, lead to relaxation of muscles and increased blood supply. The effects of a warm bath and of a hot shower illustrate this difference in reaction of the body when warmth and heat arc used. Contraction of small vessels is a desired reaction when hemorrhage is present, but cold rather than very hot applications are used more commonly to aid in checking bleeding.

There is logic in this when one recalls that cold increases the viscosity of blood. Increased viscosity slows the speed of flow, and blood clotting is facilitated by lower speed of circulation with vasoconstriction resulting from the cold.

Electric Heating Pads

The electric heating pad is a popular means for applying dry heat locally. It is easy to apply, provides constant and even heat, and is relatively safe to use. Nevertheless, careless handling can result in injury to the patient or the nurse as well as damage to the pad.

The heating element of an electric pad consists of a web of wires that convert electric current into heat. Crushing or creasing the wires may impair proper functioning, and portions of the pad will overheat. Burns and fire may result. Pins should be avoided for securing a pad, since there is danger of electric shock if a pin touches the wires. Pads with a waterproof covering are preferred, but they should not be operated in a wet or moist condition because of danger of short-circuiting the heating element and consequent shock.

Heating pads for home use have a selector switch for controlling the heat. After the heat has been applied and a certain amount of depression of the peripheral nerve endings has taken place, the patient often increases the heat because the pad does not feel sufficiently warm. Many persons have been burned in this manner.

The nurse should instruct the patient not to place a heating pad under a portion of the body or an extremity. If the heating pad is between the patient and the mattress, there may be inadequate heat dissipation. These circumstances could lead to burning the patient or bed linens. The heating pad should be placed anteriorly or laterally to a body part.

Like other devices for applying dry heat, electric pads should be covered with flannel or similar. This helps to make the heat therapy more comfortable for the patient. The pad can be used repeatedly when the cover is washed after each patient's use. However it is important not to cover the pad too heavily, for heavy covering over an electric pad prevents adequate heat dissipation.

Because of problems with burning, same health agencies do not allow the use of electric heating pads. If a patient insists on using one, he is asked to sign a from freeing the agency of liability should he sustain a burn from its use. Electric heating pads with a preset temperature control are used in some health agencies to help prevent accidents with burning. An electric heating pad can be dangerous when not used properly and carefully.

Plastic pads with tubular inner construction which can be filled with water are also available for providing local heat. An electric control unit attached to the pad heats the water and keeps it at an even temperature. The temperature is set prior to operation and the patient cannot change it because it requires a key. Such pads are useful on wet dressings when heat must be applied.

Applying an ice bag or a chemical cold pack

- Place the covered cold device on the treatment site and begin timing the application.
- Observe the site frequently for signs of tissue intolerance, such as blanching, mottling, cyanosis, maceration, and blisters. Also be alert for shivering and complaints of burning or numbness. If these signs or symptoms develop, discontinue treatment and notify the doctor.
- Refill or replace the cold device as necessary *to maintain the correct temperature.* Change the protective cover if it becomes wet.
- Remove the device after the prescribed treatment period (usually 30 minutes).

Equipment and Supplies Precautions

Equipment and supplies contaminated by pathogens can became vehicles for infection transmission if effective barriers are not developed. Equipment which is reused in providing patient care, such as a sphygmomanometer, stethoscope, and

other physical examination equipment, should be left in the patient's room whenever possible for his exclusive use until the illness has subsided. Disinfection of the equipment should be in the manner appropriate to the causative organisms and situation. Disposable thermometers are available and preferable. If a reusable thermometer is used, it should also be left at the patient's bedside in a container of disinfectant. Cleaning the thermometer before placing it the disinfectant and appropriate changing of the disinfectant solution are important points to remember. It is recommended that electronic thermometers not be used for patients on isolation because of the difficulty in rendering them safe for the next patient. Needles and syringes must be handled carefully, especially if contaminated by the hepatitis virus. Nondisposable syringes and needles should be rinsed thoroughly in cold water and then disinfected before they are prepared for reuse. The extensive availability of disposable equipment today makes the safe handling of contaminated supplies much easier. Disposable thermometers, physical examination equipment, and needles and syringes can be merely prepared for destruction after use. If linen and personal laundry is contaminated with pathogens, they should be removed from the patient's immediate environment using the double-bag technique described earlier. The outer bag's external surface should always remain clean and the bag's contents should be clearly marked to indicate that the contents are contaminated. Vigorous movements when changing bed linen should be avoided to prevent air movement and spread of microorganisms.

Modern hospital laundering processes make it possible for almost all linens of patients with communicable diseases to be handled in the usual manner. Preferable hot water-soluble bags arc available so that linen and bags can be placed directly in the hospital washing machine. Nonsoluble bags should be opened and the linen carefully placed in the washer.

For items of clothing that are not washed easily in a machine, gas sterilizers, discussed earlier in this chapter may be used. This would be a suitable procedure for items that are not washable, such as decorative bed jackets.

Home laundering can generally be safely accomplished with sufficient hot water or boiling the items and using an appropriate detergent and household bleach or disinfectant, such as Clorox or Lysol.

Most health agencies use mechanical dishwashers that leave dishes free of pathogens. If this is not the case, it then becomes necessary to take special

precautions when a patient has a communicable disease, especially one that is transmitted via secretions from the mouth. In some agencies, the dishes arc rinsed and then boiled. Other agencies use disposable dishes so that only the silverware needs boiling. The technique of placing soiled dishes in a container of water and boiling them before being washed is a questionable practice. The heat of the water often coagulates the food particles remaining on the dishes. If the organism is contained within these solids and is particularly resistant, it may survive the washing process. Therefore, the dishes should be rinsed thoroughly first before being washed and subjected to heat. Many mechanical dishwashers used in restaurants and hospitals provide for rinsing the dishes before they are washed. Rubber gloves should be worn if the dishes are rinsed by hand.

If contaminated, leftover food should be wrapped and discarded along with other wastes from the patient's room. Liquids should be poured down the drain or the toilet if a satisfactory sewage system is available. If not, they may be disinfected before discarding.

Handheld oropharyngeal inhalers

Handheld inhalers include the metered-dose inhaler (or nebulizer), the turbo-inhaler, and the nasal inhaler. These devices deliver topical medications to the respiratory tract, producing local and systemic effects. The mucosal lining of the respiratory tract absorbs the inhalant almost immediately. Examples of common inhalants are bronchodilators, used to improve airway patency and facilitate mucous drainage; mucolytics, which attain a high local concentration to liquefy tenacious bronchial secretions; and corticosteroids, used to decrease inflammation.

The use of these inhalers may be contraindicated in patients who can't form an airtight seal around the device and in patients who lack the coordination or clear vision necessary to assemble a turbo-inhaler. Specific inhalant drugs may also be contraindicated. For example, bronchodilators are contraindicated if the patient has tachycardia or a history of cardiac arrhythmias associated with tachycardia.

Implementation

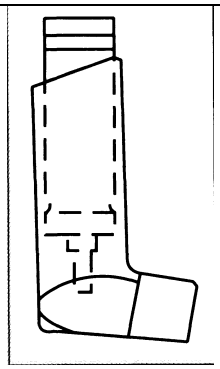
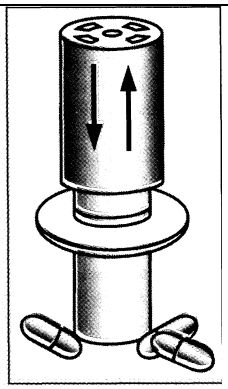
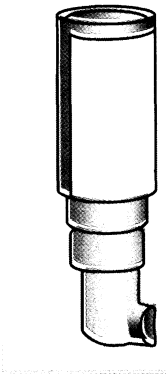
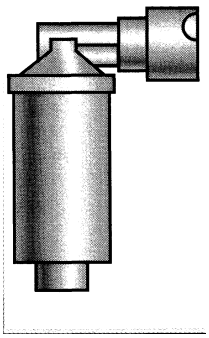
- Verify the order on the patient's medication record by checking it against the doctor's order.
- Wash your hands.
- Check the label on the inhaler against the order on the medication record. Verify the expiration date.
- Confirm the patient's identity by asking his name and by checking his name, room

number, and bed number on his wristband.

• Explain the procedure to the patient.

Types of handheld inhaiers

Handheld inhaiers use air under pressure to produce a mist containing tiny droplets of medication. Drugs delivered in this form (such as mucolytics and bronchodifators) can travel deep into the lungs.

METERED-DOSE INHALER	TURBO-INHALER WITH CAPSULES	NASAL INHALER	INHALER WITH BUILT-IN SPACER
			

Using a metered-dose inhaler

• Shake the inhaler bottle to mix the medication and aerosol propellant.

• Remove the mouthpiece and cap. Note: Some metered-dose inhalers have a spacer built into the inhaler. Pull the spacer away from the section holding the medication canister until it clicks into place.

• Insert the metal stem on the bottle into the small hole on the flattened portion of the mouthpiece. Then turn the bottle upside down.

• Have the patient exhale; then place the mouthpiece in his mouth and close his lips around it.

• As you firmly push the bottle down against the mouthpiece, ask the patient to inhale slowly and to continue inhaling until his lungs feel full. This action draws the medication into his lungs. Compress the bottle against the mouthpiece only once.

• Remove the mouthpiece from the patient's mouth, and tell him to hold his breath for several seconds to allow the medication to reach the alveoli. Then instruct him to exhale slowly through pursed lips to keep the distal bronchioles open, allowing increased absorption and diffusion of the drug and better gas exchange.

• Have the patient gargle with normal saline solution, if desired, to remove medication from the mouth and back of the throat. (The lungs retain only about 10%

of the inhalant; most of the remainder is exhaled, but substantial amounts may remain in the oropharynx.)

• Rinse the mouthpiece thoroughly with warm water to prevent accumulation of residue.

Using a turbo-inhaler

• Hold the mouthpiece in one hand, and with the other hand, slide the sleeve away from the mouthpiece as far as possible.

• Unscrew the tip of the mouthpiece by turning it counterclockwise.

• Firmly press the colored portion of the medication capsule into the propeller stem of the mouthpiece.

• Screw the inhaler together again securely.

• Holding the inhaler with the mouthpiece at the bottom, slide the sleeve all the way down and then up again to puncture the capsule and release the medication. Do this only once.

• Have the patient exhale and tilt his head back. Tell him to place the mouthpiece in his mouth, close his lips around it, and inhale once - quickly and deeply - through the mouthpiece.

• Tell the patient to hold his breath for several seconds to allow the medication to reach the alveoli. (Instruct him not to exhale through the mouthpiece.)

• Remove the inhaler from the patient's mouth, and tell him to exhale as much air as possible.

• Repeat the procedure until all the medication in the device is inhaled.

• Have the patient gargle with normal saline solution, if desired, to remove medication from the mouth and back of the throat. Be sure to provide an emesis basin if the patient needs one.

• Discard the empty medication capsule, put the inhaler in its can, and secure the lid. Rinse the inhaler with warm water at least once a week.

Using a nasal inhaler

• Have the patient blow his nose to clear his nostrils.

• Shake the medication cartridge and then insert it in the adapter. (Before inserting a refill cartridge, remove the protective cap from the stem.)

• Remove the protective cap from the adapter tip.

• Hold the inhaler with your index finger on top of the cartridge and your thumb under the nasal adapter. The adapter tip should be pointing toward the patient.

• Have the patient tilt his head back. Then tell him to place the adapter tip into one nostril while occluding the other nostril with his finger.

• Instruct the patient to inhale gently as he presses the adapter and the cartridge together firmly to release a measured dose of medication. Be sure to follow the manufacturer's instructions. With some medications, such as dexamethasone sodium phosphate (Turbinaire), inhaling during administration isn't desirable.

• Tell the patient to remove the inhaler from his nostril and to exhale through his mouth.

• Shake the inhaler, and have the patient repeat the procedure in the other nostril.

• Have the patient gargle with normal saline solution to remove medication from his mouth and throat.

• Remove the medication cartridge from the nasal inhaler, and wash the nasal adapter in lukewarm water. Let the adapter dry thoroughly before reinserting the cartridge.

Oxygen administration

A patient will need oxygen therapy when hypoxemia results from a respiratory or cardiac emergency or an increase in metabolic function. In a *respiratory emergency*, oxygen administration enables the patient to reduce his ventilatory effort. When conditions such as atelectasis or adult respiratory distress syndrome impair diffusion, or when lung volumes are decreased from alveolar hypoventilation, this procedure boosts alveolar oxygen levels.

In a *cardiac emergency,* oxygen therapy helps meet the increased myocardial workload as the heart tries to compensate for hypoxemia. Oxygen administration is particularly important for a patient whose myocardium is already compromised - perhaps from a myocardial infarction or cardiac arrhythmia.

When *metabolic demand* is high (in cases of massive trauma, burns, or high fever, for instance) oxygen administration supplies the body with enough oxygen to meet its cellular needs. This procedure also increases oxygenation in the patient with a reduced blood oxygen-carrying capacity, perhaps from carbon monoxide poisoning or sickle cell crisis. The adequacy of oxygen therapy is determined by arterial blood gas (ABG) analysis, oximetry monitoring, and clinical examinations. The patient's disease, physical condition, and age will help determine the most appropriate method of administration.

Guide to oxygen delivery systems

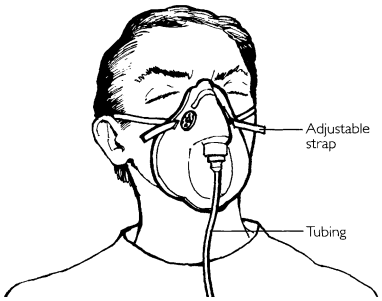
Patients may receive oxygen through one of several administration systems. Each has its own benefits, drawbacks, and indications for use.The advantages and disadvantages of each system are compared below.

Nasal cannula: Oxygen is delivered through plastic cannulas in the patient's nostrils**.**

Safe and simple; comfortable and easily tolerated; nasal prongs can be shaped to fit any face; effective for low oxygen concentrations; allows movement, eating and talking; inexpensive and disposable.

Disadvantages: Can't deliver concentrations higher than 40%; can't be used in complete nasal obstruction; may cause headaches or dry mucous membranes if flow rate exceeds 6 L/minute; can dislodge easily

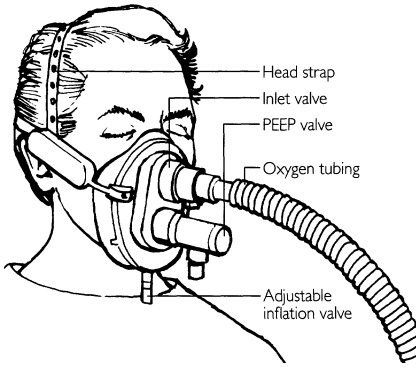
Simple mask: Oxygen flows through an entry port at the bottom of the mask and exits through large holes on the sides of the mask.



Can deliver concentrations of 40% to 60%.

Disadvantages: Hot and confining; may irritate patient's skin; tight seal, which may cause discomfort, is required for higher oxygen concentration; interferes with talking and eating; impractical for long-term therapy because of imprecision.

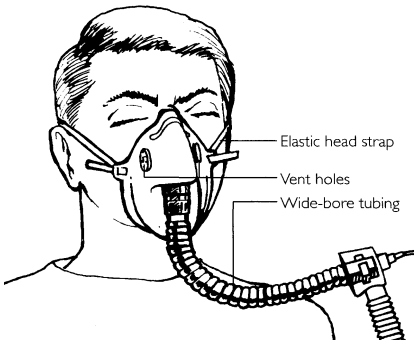
CPAP mask: This system allows the spontaneously breathing patient to receive continuous positive airway pressure (CPAP) with or without an artificial airway



Advantages: Noninvasively improves arterial oxygenation by increasing functional residual capacity; allows the patient to avoid intubation; allows the patient to talk and cough without interrupting positive pressure.

Disadvantages: Requires a tight fit, which may cause discomfort; interferes with eating and talking; heightened risk of aspiration if the patient vomits; increased risk of pneumothorax, diminished cardiac output and gastric distention; contraindicated in patients with chronic obstructive pulmonary disease, bullous lung disease, low cardiac output, or tension pneumothorax.

Ventun mask: The mask is connected to a Ventun device, which mixes a specific volume of air and oxygen.



Advantages: Delivers highly accurate oxygen concentration despite the patient's respiratory pattern because the same amount of air is always entrained; dilute jets can be changed or dial turned to change oxygen concentration; doesn't dry mucous membranes; humidity or aerosol can be added.

Disadvantages: Confining and may irritate skin; oxygen concentration may be altered if mask fits loosely, tubing kinks, oxygen intake ports become blocked, flow is insufficient, or patient is hyperpnoea; interferes with eating and talking; condensate may collect and drip on the patient if humidification is used.

The oxygen pillow represents the rubberized bag at which corner there is a rubber tube with the crane and funnel. The pillow is filled from an oxygen cylinder through a reducer intended for pressure decrease. Before the using the funnel is

wiping by the spirit and wrapping up the damp gauze combined in some layers. It is necessary to remember, that not humidified oxygen causes irritation of respiratory ways. Receipt of oxygen adjusts the crane, and also pressing by hands on a pillow. When oxygen in a pillow remained a little, it squeezes out there from a hand.

Lack of this method is that it is impossible to establish concentration of oxygen and in regular intervals to adjust receipt of gas in lungs. Besides there are losses of oxygen owe to leaky closing of the funnel. Oxygen from a pillow can be entered with the help nosing catheter.

Electrophoresis

Introduction

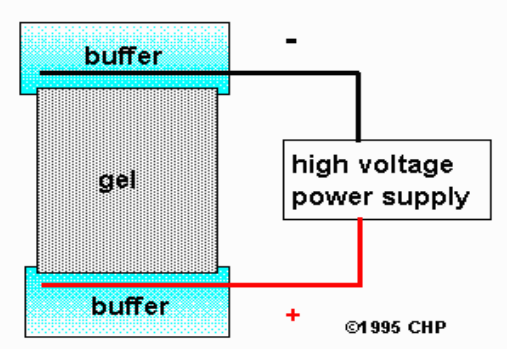
Electrophoresis is a separations technique that is based on the mobility of ions in an electric field. Positively charged ions migrate towards a negative electrode and negatively-charged ions migrate toward a positive electrode.For safety reasons one electrode is usually at ground and the other is biased positively or negatively. Ions have different migration rates depending on their total charge, size, and shape, and can therefore be separated.

Instrumentation

An electrode apparatus consists of a high-voltage supply, electrodes, buffer, and a support for the buffer such as filter paper, cellulose acetate strips, polyacrylamide gel, or a capillary tube. Open capillary tubes are used for many types of samples and the other supports are usually used for biological samples such as protein mixtures or DNA fragments. After a separation is completed the support is stained to visualize the separated components.

Resolution can be greatly improved using isoelectric focusing. In this technique the support gel maintains a pH gradient. As a protein migrates down the gel, it reaches a pH that is equal to its isoelectric point. At this pH the protein is neutral and no longer migrates, i.e, it is focused into a sharp band on the gel.

Schematic of zone electrophoresis apparatus



Hydrotherapy may be defined as the use of water, in any of its forms, for the maintenance of health or the treatment of disease. Although one of the oldest known therapies, it has received little attention from the research community, particularly recently. As one to the ancient methods of treatment, hydrotherapy has been used to treat disease and injury by many different peoples, including the Egyptians, Assyrians, Persians, Greeks, Hebrews, Hindus, and Chinese. In the *Rigveda*, written about 1500 BC, we read that "water cures the fever's glow." Hippocrates used hydrotherapy extensively around 400 BC. In his writings concerning baths are some of the earliest dictums on the therapeutic uses of water.

LIST OF PRACTICAL SKILLS

1. Take the count of document in manipulation cabinet.
2. Write a prescription on drastic and narcotic matters.
3.To show of rule filling of temperature chart.
4. To conduct taking the pulse, measurement of blood pressure.
5. To conduct taking of blood for biochemical analysis
6. To show the technique of implementation of subcutaneous injections.
7. To show the technique of implementation of intramuscular injections.
8. Calculation of soluble antibiotic's dose according to prescribing.
9. Filling up system for transfusion and conduct of intravenous infusion.
10. To prepare necessary solutions and conduct with single-use syringe.
11. To prepare necessary solutions and conduct pre-sterilization preparation of repeated tools.
12. To control of quality of pre-sterilization preparation of tools.
13. To show the technique of taking nasal and throat swab
14. To prepare the proper facilities and show the technique of implementation of cleansing enema.
15. To prepare the proper facilities and show the technique of implementation of siphon enema.
16. To prepare the proper facilities and show the technique of implementation of oil enema.
17. To prepare the proper facilities and show the technique of implementation of hypertonic enema.
18. ECG-recording in 12 leads.
19. To prepare the proper facilities and show the technique of application of heat compresses.
20. To prepare the proper facilities and show the technique of application of salve dressing.
21. To prepare the proper facilities and show the technique of instilling the eyedrops and application eye ointment into the conjunctiva sac.
22. To prepare the proper facilities and show the technique of application of mustard plasters.
23. To prepare the proper facilities and show the technique of application of cups.
24. To show the administration of humid oxygen to the patient.

25. To show the technique of application of different types of inhalers.

LIST OF QUESTIONS
for final module control

1. Ethical fundamentals of nursing.
2. Moral code of a nurse in Ukraine. International Council code of nurses.
3. Duties of a medical nurse in basic subdivisions of therapeutic hospital.
4. List of documentation, which a medical nurse keeps in different subdivisions of therapeutic hospital.
5. The main rules of medical preparations and instruments' storage.
6. Taking of account of medicinal agents in different departments of therapeutic hospital.
7. Excerption and account of drastic and narcotic matters.
8. Taking of body temperature and filling of temperature lists.
9. The rules of taking the pulse and measurement of blood pressure.
10. Work with prescription lists. Rules of providing patients with tablets and dissolved medical preparations.
11. Methods and techniques of taking of general blood analysis, blood sugar analysis, biochemical and bacteriological examinations.
12. Preparing of manipulation table for work.
13. Subcutaneous, intramuscular, intravenous injections technique.
14. Calculation of soluble antibiotics dose.
15. Rules of filling up system for transfusion and intravenous infusions.
16. The main requirements to disinfection and sterilization of instruments. Quality control of instruments' pre-sterilization for determination of blood and detergents substances remains.
17. Modern ways of repeated instruments' sterilization.
18. Rules of conducting with single-use syringe.
19. Technique of instilling drugs into nose, eyes and ears. Taking nasal and throat swabs.
20. The main rules of patients' preparation for gastroscopy, proctoscopy, and colonoscopy, ultrasonic scanning of abdominal cavity organs.
21. The main types of enemas and rules of their administration.
22. Preparation of patients and instruments for stool test for eggs of worms, blood

traces, coprogram.

23. Rules of collecting urine for Zimnitsky test, Nechiporenko test, Kakovsky-Addis test, their diagnostic importance.
24. Preparation and carrying out of gastric and duodenal intubations.
25. Methods and techniques of electrocardiogram's registration. Simple analysis of its main elements.
26. The main types of compresses. Taking of warm, cold, medicinal compresses.
27. Taking of cups, mustard plasters, hot-water bottle and ice bags.
28. Taking of leeches, conditions of their keeping.
29. Taking of pocket and hospital inhalators.
30. Methods and technique of humid oxygen supply and using of oxygen bag.
31. Acquaintance with physiotherapeutic procedures (hydrotherapeutic procedures, light procedures, electromagnetic procedures).

JOURNAL

of the work executed during the practical training in the volume of duties of a nurse in a therapeutics department by the third-year student of the medical faculty, group No.____

Name, surname_____

Name of the clinic (hospital) _____

Chief physician (name, signature) _____

From_____200__ up to _____200_

Date, work time	The list of the executed work	The signature of the clinical instructor
	Giving without assistance 5 hypodermic injections, 6 intramuscular injections in medical procedures room. Participation in carrying out of intravenous injections (2), in preparation of a solution for intravenous - drop introduction of a preparation (1). Distribution of medicines for peroral administration (20), taking a body temperature (14), measurement of arterial pressure (7), examination of pulse (12), application of mustard plasters (2), a conversation with patients on the theme “About harm of smoking”. The student’s signature	

THE FINAL REPORT

of the work executed during the practical training in the volume of duties of a nurse in therapeutics department by the third-year student of the medical faculty, group No.____

_____

(Name Surname)

Name of the clinic (hospital) _____

Term of practical training from _____ 200__ up to _____ 200 _

	Practical tasks	Executed
1.	Account of medicinal facilities in a manipulation cabinet	
2.	Filling of document of nurse	
3.	Filling of document of manipulation cabinet	
4.	Filling of temperature chart	
5.	Examination of pulse	
6.	Measurement of arterial pressure	
7.	Collection of blood for biochemical analysis	
8.	Collection of urine for general analysis, Zymnitsky's and Nechipurenko's tests	
9.	Collecting feces for bacteriological and other researches	
10.	Subcutaneous injections	
11.	Intramuscular injections	
12.	Intravenous injections	
13.	Participation in intravenous drop infusions	
14.	Calculation of dose and breeding of medications	
15.	Cleaning Supplies	
16.	Physical Means of Sterilization and Disinfection	
17.	Taking nasal and throat swabs	
18.	Administration of enemas	
19.	Carrying out duodenal intubation	
20.	Taking part in patients preparing for abdominal ultrasonography and X-ray	
21.	ECG-recording	
22.	Application of compresses	
23.	Application of mustard plasters and cupping glasses	
24.	Taking part in physiotherapeutic procedures	
25.	Other	

Instructor from the clinic (hospital) _____ (name, signature)

Teacher from the university _____ (name, signature)

Contents