

Operating Theatre Techniques

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Preface

Advances in medicine and related technological fields have had their effect on operating theatre nursing. New surgical procedures and updated concepts of patient care have been a challenge well met by the operating theatre staff. As a result of advances such as the marketing of pre-packaged sterile, disposable items, some of the burdensome tasks of the theatre nurse have been eliminated; but the theatre nurse still needs basic knowledge, logical forethought and planning to function competently in the operating theatre.

The additions to the text in this revised edition further increase the competence and understanding of the theatre nurse. A chapter on the nurse's responsibility to the Anaesthetist has been added because this aspect of operating theatre nursing is so important in surgical care. Another new chapter is "Individualizing Patient Care," which presents a framework that can be adapted to any hospital organization. This chapter outlines a realistic, workable method whereby *each* patient's individual needs can be met by the theatre nurse regardless of the hour and circumstances. The plan is a logical alternative to the pre-operative personal visit, which unfortunately is often impractical because of time and staff limitations. Of course, the pre-operative visit can be included if it is a common practice in the hospital.

This book is planned to give the graduate nurse, the nurse student, and the pupil nurse basic knowledge in theatre work, thereby increasing their value as members of the surgical team. A logical pattern of thinking is emphasized to promote completeness in work, conservation of time, personal satisfaction, and consequently good, individualized patient care.

To be of benefit to theatre nurses in different kinds of hospitals, it was essential to make the book adaptable to any institution, regardless of bed capacity, location, available funds, diseases treated, and theatre staff. The book does not encroach upon institutional policies or suggest changes in technique; e.g. it does not describe a particular sterile table arrangement or scrub procedure. Rather, it develops principles of theatre nursing that will correlate with different teaching programmes and varied practices.

The subject has been treated from the individual nurse's view of the theatre situation and of the job she has to perform. Personal attitude is discussed rather than assumed, since it is a big factor in teamwork and in respect for technique. Next, the articles of surgery (rubber goods, instruments, sutures, etc.) are considered. Principles of their care and use are recorded. There are two chapters that demonstrate the thought process of the theatre nurse in actual surgery, how she can visualize and anticipate the transactions and thereby become more adept in preparing the set-ups and assisting at the operative field. Cardinal factors of positioning and draping of the patient are included.

The text is in outline form, and examples are used to emphasize or explain the brief statements. It is hoped that the book will help the nurse carry out theatre and hospital policies to the best of her ability and ensure good patient care, that it will encourage forethought, and establish congenial attitudes.

I would like to thank Robert S. Frankel, M.D. attending surgeon, and Alfred R. Wollack, M.D., Director of Department of Anesthesiology, both of Hackensack Hospital, for their encouragement and for answering my many questions.

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1 The Surgical Team

A successful operation depends on the smooth, efficient performance of the surgical team. The team for routine operative procedures varies in number – usually from five to seven people – but the number increases when special machines are used requiring doctors and technicians (heart-lung machine), or when the presence of a cardiologist, pathologist, etc., is indicated. The team normally referred to as the surgical team consists of:

Anaesthetist – doctor administering anaesthesia.

Surgeon

First assistant

Second assistant

Suture nurse (or scrub assistant) – prepares set-up, assists surgeon by passing instruments, sutures, etc.

Circulating nurse (or assistant) – preferably a registered nurse, who is free to obtain supplies, answer anaesthetists requests, deliver supplies to sterile field, etc.

Some teams will include a sponge nurse (referred to as a second scrub nurse) who assists the suture nurse or scrub assistant. Others will not require the second assistant doctor.

Each member of a surgical team assumes a responsibility for the patient. In surgery, a patient is entrusting himself wholly to our care. He is placed in a position where he has little or no control of the activities. The meaning of *team*, as described by the dictionary, is certainly appropriate in the operating theatre: “a number of persons associated in some joint action”. And *teamwork* is defined as “work of a team with reference to coordination of effort and to collective efficiency.”

The qualities of an effective team are mutual trust, good communication between the members of the team, knowledge of procedures, and skill. Each member knows that all efforts are made for the benefit of

the patient. The surgeon depends on the nursing team to provide the necessary instruments, equipment and supplies, and he assumes that they know how to use them and care for them. In addition, he expects the team to be well-organized and confident. (The team can acquire this confidence, for example, by referring to the surgeon's preference cards, studying written procedures, and by holding frequent conferences.)

There are two additional areas, in which the team must cooperate: the prevention of infection and the prevention of explosions and fire. These will be discussed in the following chapters.

2 Prevention of Infections

The prevention of infections is the responsibility of the entire surgical team. Prevention includes not only the use of aseptic techniques and careful sterilization of supplies but also the practice and maintenance of aseptic conditions in the operating theatre. *Enforced* strict rules of conduct and dress which apply to *all* persons using the facilities, and adequate disinfection of the theatre and used supplies are of paramount importance. A low infection rate is a credit to the professional staff and also to the porters and auxiliary help. All are vital members of the preventative team. All must provide the same standard of excellent care for each patient.

In considering the prevention of infection, two important points to bear in mind are:

1. Our atmosphere contains bacteria, both pathogenic (disease-producing) and non-pathogenic.
2. When a prime barrier to infection – the skin – is broken, either by incision at the operation or by trauma or an accident, the susceptibility to bacterial invasion is increased.

Bacteria do not “fly,” but when we realize that the harbourers of bacteria such as dust, nose and throat droplets, are readily carried along by air currents, we can visualize how easily a wound can be invaded. Take time to think of what actually happens when there is unnecessary activity in the room, or when a team member pulls off his mask while assisting in the transfer of the patient to the stretcher. Certainly the atmosphere of the operating theatre environment is being affected.

The operating theatre staff must be vigilant in order to eliminate pathogens and keep the environmental bacterial count down. The following is a list of points of which all operating theatre personnel should be aware. As you read each one, think about the reasons behind it.

1. No one who has a cold or infection should be permitted in the operating theatre.
2. Personnel and doctors must follow the rules regarding special operating theatre dress.
3. Operating theatre attire must be changed before leaving the suite and on return. This also refers to shoes.
4. Special shoe coverings are advisable.
5. An adequate cap must be worn to cover the hair.
6. Special face masks are worn to prevent bacteria from passing through.
7. Masks are changed between operations. Choice of efficient masks is important.
8. Conversations during surgery should be kept at a minimum.
9. Rooms, furniture, lights, and equipment must be cleaned after every list. Use method prescribed by your hospital (e.g., germicide-detergent, wet vacuum, etc.)
10. Room schedules must be arranged so that operations of contaminated or infected cases are not done before clean cases. A modern concept practiced by some hospitals is to use precautionary procedures for *all* cases (treat all as if they were infected).
11. Employ good scrub techniques. Stress attention to fingernails and skin crevices. Good friction (with brush) and proper rinsing is essential. Post rules for all to follow.
12. Circulating nurse (or assistant) must wash hands frequently.
13. Skin preparation of patient must be adequate.
14. Make sure sterilization of all supplies is completed.
15. All members must practice good aseptic technique. Recognise breaks and remedy immediately.
16. Traffic into and out of the theatre must be kept to a minimum. Keep doors closed.
17. Unauthorized personnel are not allowed in the theatre.
18. Ventilating systems, location of rooms, exchange areas should be studied, and the knowledge of them applied wherever possible, to contribute to the prevention of infection.
19. Good orientation of staff about rules, and insistence that all persons abide by them.

20. Conduct in sterile area:
 - a. Exercise care.
 - b. Always face the sterile field to prevent accidental contamination.
 - c. Never walk between two sterile fields.
 - d. Do not set up cases for operation near doorway (to avoid accidental contamination).
 - e. Do not lean over sterile field, nor reach arms over sterile field.
 - f. When scrubbed, keep arms flexed at elbow and do not drop hands down.
21. Always allow for a wide margin of safety.

3 Hazards

a. Prevention of Explosions and Fire

Three elements must coexist before an explosion can take place. They are 1) oxygen, 2) an inflammable or explosive substance, and 3) a source of ignition. Oxygen is present, of necessity, in the operating theatre, and therefore it is imperative to eliminate the second and third elements or else take the proper precautions.

Because the static spark is the least predictable source of ignition, it is one of the most menacing. Technically, the spark is generated by the coming together of two objects having different electrical potentials. This means that one object has accumulated more electrons than the other. An example that is often used and easily understandable is the “snap” you hear when you walk across a wool rug and then touch a metal object. In a darkened room you may see the spark. You have accumulated excess electrons which are discharged to the metal object because of the tendency of electrons to equalize. Furthermore, you will note this occurs mostly in the winter, when the air is drier and static electricity is not dissipated.

Conductive surroundings (floor, furniture) provide a route of discharge of electrons from the environment. By “earthing” the personnel (conductive shoes) and by eliminating barriers to conduction (such as heavy, dry socks between skin and conductive innersole; wax and debris on outer sole of shoes), the electrons can be prevented from building up disproportionately.

The following are some rules observed in hospital theatres. Take time to analyse the reason behind each one.

1. Wear cotton clothing. Wool and nylon garments (the latter particularly if loose fitting) are potential dangers. (Static electricity.)
2. Be sure your shoes are conductive. (Special conductive shoe coverings ought to be available.)

3. No smoking in the operating suite.
4. All floors and furniture must be conductive.
5. Keep floors, castors, chains conductive by keeping them clean, free from dirt, lint, and debris.
6. Be sure patient is conductive (just as everyone else in the room).
7. Report defective electrical equipment immediately.
8. Diathermy, X-ray, and electrical motors (which produce sparks) must not be used in the presence of explosive anaesthetic agents.
9. Electrical outlets should be interlocked. Spark producing electrical switches and wires must be above a five foot level.
10. Mattress covers, anaesthetic masks and tubing must be of conductive material.
11. Make sure humidity is at least 55%.
12. Anaesthesia machines must not be stored near radiators, and those being stored should not be covered unless gas cylinders are removed.
13. Display explosion protection rules, and insist that all persons abide by them.

b. Radiation Hazards

Great care must be taken when X-rays and sealed radio-active sources are being employed in operating theatres.

1. When X-rays are being taken, all staff must be protected adequately with lead aprons, shields or gloves, particularly during angiography.
2. All staff who are constantly working in X-ray theatres should wear some monitoring device which must be checked regularly.
3. When sealed sources of Gamma rays are being inserted, i.e: Radium needles, gold seeds, Caesium or Cobalt, the sources should not be touched by hand: they should be removed from their protective containers with long-handled forceps just before use, sterilised in lead protected containers and transferred to a sterile covered lead trolley.
4. Any losses or breakages of radio-active sources in the operating theatre must be reported at once to your Hospital Radiation Safety Officer.

4 Personal Attitude

The people you work with and those you serve judge you by your work and by your personal attitude. Personal attitude influences all aspects of hospital relationships – from a friendly morning greeting to economy of hospital equipment.

Personal Appearance

Good posture, cleanliness, neatness – all are indications of a person's self-respect. If, in addition, a nurse is enthusiastic about life, her job, and herself, there is an aura of alertness about her that makes a tremendous impact upon the people she works with, and her performance as a team member rates high. These qualities are prerequisite for an operating theatre nurse.

Consideration of Others

Surgical operations are carried out in team fashion (surgeon, assistant, scrub nurse, circulating nurse), and the need for harmony is paramount. Consideration of others is exemplified by tolerance, kindness, gentleness, and even the kind word and smile that is welcomed by everyone. No matter how skilled you may be, gentleness must be present. In comparison, arrogance breeds defensiveness in others and, thus, defeats group function.

Cooperation

No matter how large or small the hospital is in which you are employed, cooperation is a *constant* process. You cooperate by teaching, that is by passing on knowledge you have gained from a certain case or

procedure. For example, a surgeon desires a change in his routine or choice of suture — report this to your supervisor. You will use the system of communication set up in the department, whether it is a card system, a procedure book, or daily conference manual. Cooperation has several effects:

1. The patient benefits, as better care is achieved.
2. The nursing staff benefits by becoming more efficient and secure in their work.
3. Errors are not repeated and time loss is avoided.

Cooperation is a give-and-take that is a *sine qua non* for group function. There is no place for selfishness in this situation.

Professional Conduct

The surgeons and nurses you admire always maintain a professional attitude while at work, and thereby promote good rapport between co-workers. In surgery, where everyone is responsible for getting the job done, any social relationships become professional relationships. Friendships must stand up, and they will when an individual values a friendship enough to grant the other person respect while performing his or her work.

First names, wise remarks, references to social activities, loud talk, singing — these mean lack of concern for others, lack of sensitivity as to how such behavior might affect the people under tension at the time of an operation; the result is that proper relationships between doctor, nurse, and patient are destroyed.

Mature, professional conduct creates the opposite effect. People respect you, you attain more cooperation from your co-workers, and above all, the patient feels more confident if the environment is professional at a time of great importance in his life. Patients have many preconceived concepts of hospitals and surgery which may be magnified by conversation and noise.

Although the noise, surgical terms, and conversation concerning patients' ills are everyday occurrences to the theatre nurse, these are strange to a patient and he may misinterpret them.

Emotions and Personalities

During surgery, your personal feelings and responses to people or circumstances must not show. Surgery is no time for an exhibition on your part – the patient comes first. Smart answers, sighs, and the like will gain no victory for you or the patient. They will not alter the situation, or add to your reputation, but they will increase tension.

For example:

1. Anger demonstrates a feeling of helplessness. Ask yourself: “Should this situation make me feel helpless?” If not, the anger is the other person’s problem. So do not get involved; you will be emotionally free to help solve the problem instead of increasing it.
2. Do not misinterpret tension for anger. A surgeon is under tension if he “yells” for a clamp, and continues to do so until you give him the correct one. Remember, he has to cope with an emergent situation, and it is natural that he responds sharply, with tenseness.

Refrain from unnecessary comment. Your poise will be maintained, and your ability will be evident.

1. A comment sometimes is an attempt to get off the hook. To say “I didn’t lay this set of instruments” or “Nobody tells me anything” means trying to place the blame elsewhere. To blame is a common phenomenon. Placing blame on someone else doesn’t help the situation. How to solve the problem at hand must be the only concern.
2. By maintaining poise and solving the problem you create the proper situation. You send for the instruments the surgeon desires that are missing from the set. Instead of making a comment, you make a silent remark to yourself: “I have learnt something” or “Perhaps I should get more information on this procedure when the operation is over” or “Next time I will check my instrument set-up before I begin.”

Results of refraining from unnecessary comment:

1. Sometimes, a surgeon will apologize or explain his reactions.
2. He may be more willing and interested to teach you his preferences.

3. You will be better equipped, materially and mentally, for the next time.

Remember, everyone in the operating theatre is under tension, not only you. You are an assistant. Forget yourself, drop resentment, and *think* about the other fellow.

Our personality make-ups differ because of past experiences, ambitions or lack of ambitions, goals in life, feeling towards mankind, and needs to satisfy one's self. But any one of us may, from time to time, demonstrate one or the other of these traits. Self-examination and an honest effort to overcome one's faults can result in a happier person, and certainly a more efficient and desirable member of an operating theatre staff.

Attitude Toward Responsibility

Everyone desires responsibility, for it is indicative of the trust of others and it encourages action. If you are given responsibility, remember that it is not something you pick up today, and discard tomorrow. For example,

1. Proper identification of a patient is of paramount importance. You are trusted to re-check the patient's identity upon his entrance to the operating theatre. No matter how many tasks you may have to attend to, you must re-identify the patient. Do you *always* do this?
2. When you are responsible for supplying a suite correctly, do you observe the small items? Do you report the depletion of certain supplies, or a cabinet door that does not close correctly? This would be fulfilling your "unassigned" responsibility as well as your assigned task.

Conscience Toward Technique

You have a very responsible position. Every set-up a doctor uses is prepared by a nurse. A good part of the doctor's success and the patient's

well-being is in your hands. Remember this obligation. Only you can answer this question, "Did I use good surgical technique while preparing and executing this procedure?" Everyone connected with the procedure is sure you did. Have you betrayed these people and yourself?

Sterility is a matter of either . . . or. Articles are either sterile or unsterile. There is no "almost sterile." When any question about sterility arises, consider the article unsterile. *For example:*

1. An area is draped for a fractured hip. You did the drape and are satisfied with the technique. The first assistant may question the sterility of one sheet. Have that sheet removed, or the entire towel, if necessary. Debate is absurd.
2. Treat each patient as you would like to be cared for yourself. (Think about this for a moment — you would want the best work performance, and you would allow for no mistakes.) Practice this at all times.

Time is an important factor in operating theatre work. There is constant mention of time during the working day. But do not be overwhelmed by this. Those who keep "pushing" you consider time secondary to approved aseptic technique. *For example:*

1. No one who tells you to set up, as fast as possible, for an emergency operation wants you to sacrifice sterility. They would sincerely want you to take the time necessary, if it meant the choice of your table being sterile or unsterile, or the operating theatre complete or incomplete.
2. Picture this situation: During a surgical procedure, the drape near the operative field becomes damp. The nurse is occupied passing interrupted sutures to the surgeon, and the hands of both pass over the damp drape. In this case, the nurse's desire to please the surgeon has become stronger than her conscience toward technique. The surgeon depends on the nurse to recognize the contamination, and take the time to remedy it. No surgeon wants a nurse "to keep up to his speed" on an unsterile field.

Professional honesty covers a wide scope. In a theatre, many errors occur other than breaks in aseptic technique. All these errors

affect the patient adversely. *For example:*

*Errors the nurse
is aware of*

Lack of honesty

Result

Mistake in solution

You hope the surgeon
does not realise the
solution is water
instead of saline

The skin graft may not
“take” successfully

Passing 3-0 silk
instead of 2-0 silk

You pray the 3-0 silk will
not break when tied

The hernia recurs

Losing a needle

The surgeon may never
know

A perforated viscus makes
a secondary operation
necessary

Your lack of professional honesty, perhaps, lets you “get through another case.” But it’s you who causes the complications.

A nurse who passes instruments plays a vital part in successful surgery. Your honesty is paramount. Fear of reprimand is misplaced and insignificant compared to the catastrophic results to which your mistakes can lead. Have character enough to face your shortcomings.

Interest in Work

You must acquire interest in your work. That’s the only way you will increase your knowledge of surgery. *For example:*

1. When assigned to an operation that is new or vague to you, seek information *before* the time of surgery. To be of value during a procedure, you must know the anatomy involved and the method of surgery employed.
 - a. Refer to books.
 - b. Ask your supervisor to have an instruction conference.
 - c. Write up the case afterwards — this gives you reference material for the future.
2. When the operation is performed, the surgeon can sense your interest, and this will prompt him to show you anatomical structures,

and explain the procedure. On the other hand, if he senses your lack of interest, he will feel there is nothing to be gained by teaching you.

3. Your complete and constant interest in mastering details, even the smallest, reflects in your speed and efficiency in more complex surgery. Do not form poor habits, such as
Gazing out the window.
Setting up the tables in a slipshod manner.
Taking short cuts and not conforming to standard set-ups.
Preparing too much suture ahead of time (creates waste, and does not increase your speed).
Placing several instruments on the operative field, for the surgeon to choose from – whereas you should anticipate which one he will want next.
Forgetting to check the instrument tray for completeness and correct order.

Keep your standard high at all times, Do not allow yourself to reach a point where you are bored or above doing the small or common surgical procedures. Let any situation become a challenge to your skill and speed.
For example:

1. Inguinal herniorrhaphy. Try to recognize the sac when the surgeon does. Realize at which point the defect is ready to be closed. Know method of closure, such as ligature, suture ligature, or purse string. Pass this to surgeon at proper time. Know type of repair surgeon favours. Pass correct length and strength sutures without his having to ask for them.
2. If you can anticipate the surgeon's needs, and have employed your utmost skill and speed – you have met the challenge. How can you feel that the common surgical procedure is routine? Every case varies in some manner. There is always something to keep you interested, if only you will look for it.

Economical Use of Hospital Equipment

It is a professional responsibility to give the best service, with the best equipment, at the lowest of operating costs. This does not mean to economize at the expense of safety. Safety must never be lost in an attempt to save money.

Hospital supplies are costly items. Your attitude toward these investments can either save money or upset the operating theatre budget. It is part of your job to respect the equipment you are given to work with. Careless use of equipment costs money. To offset this loss, hospital rates must be raised, or the operating theatre budget has less purchasing power. Either alternative affects you and the patients.

1. Investigate the cost of one sponge. How many clean sponges have you discarded that could be reesterilized?
2. Investigate the cost of skin preparation solutions. How much solution have you wasted by pouring the same amount for the skin preparation of a hand as for skin preparation of a bilateral vein ligation and stripping?
3. Take time to study the waste and expense that go on every day. Then be constructive with your criticism and suggest means of preventing such loss.

5 Equipment

The term “equipment” refers to all items used in an operating theatre. Hospitals provide the surgical staff with as much equipment as their resources will allow. The value of the equipment, in money, is high, but the value to the patient and the staff must be measured by a different scale. A piece of equipment, if given proper care, if its qualities and purpose are understood, and if it is used correctly, increases in worth. In contrast, a piece of equipment is superfluous when it is maltreated, and its purpose and use are vague to the staff.

It is essential that you know the equipment the institution has supplied the staff to work with. Sound and fast execution of the procedures depends upon the staff’s knowledge of the location and use of these articles. You cannot always rely on others being around to tell you where seldom-used items are located or whether, in fact, they are available. Nor can you wait until you are called upon to use a piece of equipment, to learn how it is correctly operated.

During the period of your orientation to an operating theatre, you will be taken on a tour. This will give you a general idea of the extent of available equipment. Use your own initiative, when slack moments are present, to investigate cupboards, inventories, and instructions for use. As new items are purchased, know where they are located, how to use them, how they are sterilized or made ready for use, and how they are cleaned and stored.

When you go to another hospital, you will not always find the same items you are accustomed to using. Find out in which way the equipment you know is supplemented by other items, and get acquainted with these. By doing this, you become a valuable member of a staff.

The fast pace of research and specialization provides the surgeon with a variety of materials for treatment. Prosthetic appliances illustrate the importance of knowing about the physical properties of the product and following manufacturer’s instructions. For example,

1. Certain medical grade silicone rubber implant materials must be

carefully washed, protected from any lint, and handled only with gloves on. Lint, etc. can cause foreign body reactions.

2. Cardiac pacemakers must be gas sterilized or the mechanism will be rendered useless.
3. Orthopedic femoral head prostheses or fixation devices must be protected from scratches. Body fluids may react on the surface causing corrosion at this point and subsequent failure of the device.

Disposable Equipment

Today, many operating theatre items are being replaced by similar disposable products. They are evaluated by your supervisor on an individual basis.

1. They may be a good substitute, or they may be a poor substitute because of poor packaging, or limited performance.
2. The cost may be prohibitive.
3. They are an economy to hospitals because they are labour-saving, but they are an expense to hospitals when carelessly handled, over-stocked, and incompetently used.
4. They are a time-saver in operating theatres because of convenient packaging and sterility readiness, but cause time loss if opening the packet is not understood or practiced.

6 Rubber Goods

Various types of rubber goods are required in operating theatre work. These are costly items in a hospital budget. Their proper care, use, and storage, therefore, is as much a matter of hospital economics as of having efficient equipment on hand.

Many rubber items in hospitals are being replaced by disposable plastics, and such innovations as gas sterilizers, and disposable gloves are reducing the complicated care of rubber goods. However, this modern equipment is not always available, and there are basic considerations concerning rubber items that you must know.

Proper Care of Rubber Goods

Clean rubber goods thoroughly.

1. Adhesive, blood, and excretions deteriorate rubber.
2. Adhesive, blood, and excretions impair sterilization.
3. Dried blood and excretions "block" tubing and render it useless (Levin tubes, drains, suction tubing).

Do not place tight rubber bands around tubes.

1. Patency is impaired by constriction of tube.
2. The tube may be weakened at the site of constriction.

Do not "bend" tubes on themselves.

1. This produces a permanent kink.
2. It weakens tube at site of flexure.

Sterilize rubber goods the required length of time, *no longer*, as prolonged sterilization softens this material. Do not use chemical disinfection, as elastic quality prevents adequate penetration; some rubber may absorb chemicals and then irritate tissue.

Avoid sterilizing rubber bands around instruments, or rubber tubing along with instruments, or while the rubber is attached to an instrument.

1. The rubber prevents the sterilizing steam from reaching the instrument.
2. The rubber tends to “stick” to the instrument as a result of the heat.

Do not open individually wrapped sterile catheters or gloves indiscriminately.

1. If they are not used, these articles will be subjected to a repeated sterilizing heat.
2. Additional labour is needed for repeating the packaging process.

Correct Use of Rubber Goods

Have regard for primary purpose of rubber goods. *Misuse is costly.* It may ruin the item for future service, and may endanger the patient’s recovery. *For example:*

1. Do not use good catheters as tourniquets. (Less expensive tubing has been designed for this purpose.)
2. Do not cut new tubing indiscriminately. (Previously cut tubing may be available and prove adequate.)
3. Know the various types of rubber goods that are required for specific procedures, and have them available. This ensures good patient care, and avoids expensive improvising. *Examples of waste:*
 - a. Cutting rubber glove to cover end of bowel, when rubber-dam should be available.
 - b. Cutting an expensive long-arm “T” tube to obtain a regular “T” tube, when draining a common bile duct.

Examples of good patient care:

- a. Have correct size tubing or drains ready for use. This prevents trauma to patient, confusion in the operating theatre, and speeds the surgery along.
- b. Have proper length suction tubing. The more connecting tips there are, the more areas that may become “plugged”; tubing of excess length increases the danger of contamination, because it is more likely to fall off the sterile field.

Test rubber goods prior to sterilization, and verify efficiency prior to use at operative field. *For example:*

1. Are tubes and catheters patent?
2. Is the bulb syringe resilient?
3. Is the inflatable bag of the Foley catheter strong and intact?
4. In general, check rubber goods for elasticity.
5. Be aware that conductive rubber tubing loses its conductivity after long, hard use. (The molecules will separate and this will interrupt the conductive chain.)

Wound drains are usually anchored in place.

1. Have suture or pin available for anchoring.
2. If drain is fenestrated prior to use, do the cutting in direction away from operative field to prevent the loss of fragment in the wound.

Storage of Rubber Goods

1. Dry rubber goods before storing.
2. Store in dry, cool area.
3. Place catheters and drains in straight position, not coiled.
4. Segregate tubes, drains, and catheters according to type, size, and length – thereby . . .
Promoting speedy selection.
Facilitating the taking of inventory.
5. Notify proper person when stock supplies of rubber goods are below working inventory.
6. Do not overstock rubber goods. They may become outmoded, and they may deteriorate.

7 Glassware

Included in the equipment of an operating theatre are many articles made of glass — colostomy rods, medicine glasses, connections, catheters, syringes, etc. These articles are used by the entire operating theatre staff and handled constantly. This, coupled with the fact that glass items are fragile, makes *proper care* important — to promote safety in usage, and prolonged usefulness, which keep down expenses.

Inspection of Item

1. *Check for cleanliness before and after sterilization.* Glassware, the same as any article prepared for sterilizing, must be absolutely clean. Dirt and dry blood deter the sterilization process. It is necessary to check again for absolute cleanliness after sterilization to detect any silt or foreign matter present that would clog the drainage tube, be injected into a patient, or prevent proper suction.

In brief, the inspection for cleanliness . . .

Ensures proper sterilization.

Ensures proper function of the article.

2. *Check for presence of cracks or chips.* Cracks and chips in glassware predispose to injuries. Glassware so damaged must not be used, and you must report such articles to your supervisor who will follow hospital procedure to obtain replacements. In some hospitals, the ordering of syringes and glassware is done on an exchange basis. The supply is replenished by turning in the broken article for a new one.

In brief, close inspection for cracks and chips in glass . . .

Safeguards the patient against injuries.

Safeguards the staff against injuries.

3. *Check for completeness.* Precious minutes are lost when it is found that a glass syringe does not work, or that drainage cannot be established because the glassware is incomplete. It is as important to

have the correct glass article as it is to have the correct instrument. Remember, every delay in the theatre subjects the patient to more anaesthesia time. *Examples of completeness:*

- a. *Glass syringes* must have correct correlating parts.
- b. *Asepto syringes* must have correct size rubber bulbs.

Care of Glassware

1. *Cleansing.*

Cleanse article immediately after use.

- a. Cleansing is facilitated.
- b. Prevents syringes from sticking together.
- c. Avoids permanent stains on glass articles.

Segregate articles for cleansing.

- a. Articles used with oil-base solutions should be separated from other articles to prevent the spreading of oil.
- b. Articles used with strong acids (carbolic, etc.) must be segregated to receive caution when washed, so that burns are avoided.
- c. Articles used for dyes (methylene blue) or adhesive mixtures (collodion) must be segregated to prevent spreading of dye or sticky material to other equipment.
- d. Articles used with potent drugs (mustard gas) must be rinsed well with water before syringe and needle are touched with bare hands.

2. *Transporting glassware.*

A large percentage of breakage occurs while glass articles are transported between storage area and the theatre in which they are actually used. *Some safety habits are:*

- a. *Place* away from edge of table or trolley.
- b. *Keep* in plain view.
- c. *Do not* place on lower shelves of portable tables. Glassware may move during transportation and fall off.
- d. *Do not* heap other items on top of glassware.

Breakage occurs, too, when transporting glassware from sterilizer to sterile table. *Caution:*

Circulating nurse -- Be certain article will not roll off sterile carrier.
Suture nurse – Receive glassware and place in safe area on table.

Sterilization of Glassware

1. Separate articles (glass and rubber) that fit into each other.
 - a. To provide open surface for sterilization. (Steam or disinfection solution will be able to reach all parts.)
 - b. To prevent rubber from sticking to glass articles for example, the rubber bulb from sticking to the syringe, or the rubber tubing from sticking to the connection).
2. Exercise care when placing glassware in the sterilizer.
 - a. To prevent breakage.
 - b. To facilitate easy removal from sterilizer.
3. Conform to hospital policies and manufacturers' requests.
 - a. Some glass items cannot withstand high temperatures and must be soaked (chemical disinfection), or a gas sterilizer must be used.
 - b. Institutions vary in their methods of sterilizing glass items.
 - c. Manufacturers of specialty instruments made of glass provide definite rules to ensure complete sterilization and prolong the life of the article.

Take time to investigate the sterilizing method prescribed in your hospital. *Result:*

Valuable items are not ruined.

Valuable time is not lost.

Storage of Glassware

1. Separate location
 - a. Special storage area for glassware decreases possibility of breakage by heavy instruments.
 - b. Specific location for each item provides accessibility and prevents confusion.

2. Store in boxes or bins
 - a. Prevents article from rolling off shelf.
 - b. Keeps articles dust free.
 - c. Facilitates inventory.
 - d. Encourages cautious handling.

Consider the cost of a syringe or water flask – find out what it is in pounds and pence. Then think of what you have dropped on the floor or rendered useless because you ignored simple directions!

8 Drugs and Solutions

Drugs and solutions are required for the basic cleaning of the operating theatre, the preparation of the surgical set-up, the scrub procedure of the operative team, the skin preparation of the patient, as medications used during the operation, and for cleaning of the theatre and equipment after the operation. Hospitals vary in their choice of drugs and solutions, yet basic needs must be met, both in relation to the performance and quality of the drugs involved.

In the operating theatre you are constantly entrusted with the use of drugs and solutions. For the patient's safety, your own safety, and in order to be an intelligent surgical team assistant, you must understand and consider the following points which affect the use of drugs and solutions.

Disinfecting Solutions

Know the names and qualities of solutions used to disinfect by chemical means.

1. Solutions are selected according to item being disinfected.
 - a. Some solutions dissolve finishes and enhance rust.
 - b. Some solutions cause corrosion.
 - c. Some materials absorb the disinfecting chemical (e.g., certain plastics, conductive rubber anaesthetic masks) and tissue injury or skin irritation will occur on contact with the material.
 - d. Solutions vary in effectiveness against different bacteria.
2. Know percentage strength of solution.
 - a. Over-diluted solution will not achieve disinfection.
 - b. To use stronger solution than necessary is wasteful (or, possibly, ineffective as in the case of alcohol).
3. Know time necessary to achieve disinfection.
 - a. Time varies with solution employed and type of bacteria present.

- b. Prolonged soaking dulls sharp instruments.
- 4. Know terminology used in classifying disinfectants.
 - a. *Bacteriocide* – agent capable of destroying bacteria. (Note: this does not mean *all* bacteria. It is imperative to know what specific bacteria a bacteriocide is effective against).
 - b. *Bacteriostat* – agent inhibiting bacterial growth. (Many of the surgical scrub soaps are bacteriostats.)
 - c. *Sporicide* – agent capable of destroying spore-forming bacteria.

Factors in using disinfecting solutions.

1. Complete submersion of article is necessary. All surfaces of article must be in contact with solution. *For example:*
 - a. In sterilizing polyethylene tubing, secure the coil within the folds of a gauze. This will prevent coils from protruding from solution. While submerging into the disfectant, inject (by syringe) the same solution inside the tube to achieve contact for the entire tubing.
 - b. Instruments must be opened.
 - c. If instrument has several parts these must be separated (cystoscopes, etc.)
2. Do not move the receptacle during disinfecting process. Solution spilling up sides of receptacle causes contamination by washing bacteria back into chemical agent. If this occurs, time cycle must be begun anew.
3. Re-use solutions if practical.
4. Thoroughly rinse disinfecting solution from all surfaces of article before use.
5. Soaking ampules for disinfection is considered a dangerous process. An unrecognized crack in glass may allow the entrance of solution into medication, with resulting injury to the patient.

Skin Preparation Solution

Each institution has a routine procedure to render the operative site surgically clean. Procedure and choice of solutions varies with the type of surgery and age of patient. *For example:*

1. *Industrial accident.* Routine skin preparation is preceded by removal of gross dirt or irrigation of wound.
2. *Cranial surgery.* The removal of hair is usually not done on the ward but in the anaesthetic room. There is a special set-up for removal of hair prior to entering the actual operating theatre. The condition of the scalp is a factor in the choice of skin preparation solution.
3. *Paediatric surgery.* The sensitive skin may indicate the need of a special solution. Similarly, patients with allergies may require a change from routine preparation.
4. *Facial surgery.* Surgeon may request colourless solution.
5. *Orthopaedic surgery.* Routine procedure is revised to provide for additional skin preparation before coming to surgery as well as in the operating theatre, if the surgeon requires this.

Hazards to be avoided.

1. Prevent burns from strong solutions. Check percentage strength of solution you are using.
2. Prevent injury to ears and eyes and mucous membrane. These parts may have to be protected by cotton, towels, vaseline or gauze fluffs.
3. Prevent "pooling" of solution. Solutions running down arms or sides of patient may accumulate and cause burns or skin irritation.
4. Use only the solution requested. If a wrong solution has been poured and used, report this immediately so steps may be taken to rectify error.

Emergency Stimulants

Know drugs institution uses, and know where they are located.

1. Have proper syringes and needles at this location.
2. Have file for ampoules.
3. Have vials ready for use.
4. Restock drugs after emergency. Restock syringes and needles.

Know how drug is administered.

Note: At the time of an emergency, you cannot lose a second. Therefore, it is logical to have the necessary equipment located by the side of the drug. Imagine that you had to run one place for the stimulant, another place for the syringe and needle, and then hurry back to the patient, and calculate the time that would be lost. Furthermore, if you are not sure how the drug is administered, you are likely to return with the wrong equipment. Always restock equipment in preparation for the next emergency.

Drugs for Specific Surgical Procedures

Know drugs required for procedure. *For example:*

1. Specific drugs are needed to accomplish local anaesthesia (eye, throat, nerve surgery, etc.).
2. Specific drugs are used in diagnostic Radiography (kidney, gall bladder, cranium).
3. Specific drugs are used for cauterizing.
4. Specific antibiotic drugs may be indicated.
5. Specific drugs are used to aid haemostasis.

Have drugs available for procedure. Ask yourself:

1. Is drug administered at sterile field? If so, then prepare it and have it ready for use by the surgeon.
2. Is drug administered by circulating nurse? If so, then prepare it and have it ready for use.

Note: In either case, do not throw away ampoule or bottle. Keep it to show doctor the label before he uses the drug. This is protection for the patient, the surgeon and you.

Exercise care in handling of drugs for Radiography at the operative field, e.g., cholangiogram. Be sure adaptor fits securely on syringe.

1. Spillage will distort X-ray and outline of duct or organ will not be clearly defined.
2. Solution may be irritating to other tissues.

Basic Considerations

Read label three times. (Suggested procedure: Read it on the shelf or in the box as you are picking up the drug or solution; read it before you pour or draw into syringe; read it when you are replacing drug back on shelf.)

1. Keep label legible.
2. Do not use ampoule with worn label.

Keep drugs in order.

1. For easy selection.
2. To aid in daily ordering.
3. To prevent depletion of supply.

Know deterioration factor of drugs and solutions. Recognize changes due to

time	light
heat	air
cold	moisture

Label syringes, bottles, or pitchers containing drugs and solutions that are made ready prior to use. *For example:*

Suppose you have added the prescribed amount of heparin to 200 cc. of sterile normal saline, for use as irrigation of the vessel in an embolectomy procedure. Label the bottle accordingly. If you leave the room and another nurse takes over your duties, there will be no question in her mind as to what is in the bottle.

Place medicine cups containing drugs in tray as a precaution in case they are inadvertently toppled.

1. Will not spill on table (potential contamination).
2. Will not spill into open wound.

Chart medications used during surgery to inform nurse on patient care unit.

Realize that some drugs demand special caution (ether, acids, caustics), and protect the patient and yourself.

Have antidotes on hand for untoward effects of drugs, e.g., a barbiturate as antidote for cocaine, or adrenaline for allergic reactions to

contrast media.

Keep informed about new drugs.

1. Read the brochure describing the drug.
2. Know method of its use in your institution.
3. If a new drug is used, report this to your supervisor so she may plan a teaching session for the rest of the staff.

9 Linen

Even though disposable paper drapes and supplies are now available, linen is still a very important item in an operating theatre, and is popularly used. To select the proper linen and dry supplies for an operation, to maintain sterility, and avoid needless waste, you must know several important principles.

Sterile Supplies for Operative Case

To avoid omissions and extra steps, determine the requirements for each operation by a logical approach.

1. Select pack designed for specific procedure, or, if not available, individual packets containing table and furniture covers, towels, and patient towel.
2. Choose specific supplies needed (sponges, pads, dressings, syringes, needles).
3. Obtain sterile bowls and skin preparation sets.
4. Determine number of gowns required for the case, and place with your supplies.
5. Select gloves in the sizes worn by the members of the surgical team.
6. If instruments are wrapped and sterilized by a central service department, select the correct pack.

Basic Considerations

When folding linen for sterilization and, again, when using linen at operative field, inspect for holes.

1. You prevent contamination. (A hole in a sterile piece of linen defeats sterility of the field.)
2. You prevent "beyond repair" damage of linen. (A small hole is mended more easily than a large tear.)

To assure sterility of linen packs, refer to regulations on autoclave temperature and time, limitation of size, placement of contents in pack, and position in autoclave. Do periodic spore strip test within packets.

1. Sterilizing steam must penetrate entire pack. Too large a pack, or one with heavy solid items in the centre, will deter this process.

Note: Placement of “sterilizing condition” indicator in the centre of *each* pack is an added safety measure. It means that steam has penetrated into the centre, but the actual temperature and time of exposure which would assure sterilization is vague. Sterilization can only be assured through rigid regulations and constant observation of the graphic autoclave charts by competent personnel.

2. Trays or bowls in linen packs prevent the steam from penetrating the linen articles directly beneath.

3. Position in autoclave, and time of exposure to sterilizing temperature varies according to articles being treated.

4. Packs must be dry before removal from autoclave.

After a designated length of time the article is considered unsterile and unsafe. Packs are dated either with the date of sterilization, or the expiration date. Investigate which system your hospital uses. Remember, however, that misuse, improper storage, or dampness can render packs unsterile, regardless of any date on it.

Store sterile goods in clean, dry area.

Rotate sterile supplies. (As sterile packs arrive for storage, place them in back of present supply.) Use previously sterilized items first.

Avoid confusion. Never place “to be sterilized” bundles near sterile bundles.

Put open sterile packs in a place that is convenient and safe.

1. Saves steps, and speeds handling.

2. Avoids possible contamination.

Do not replace sterilizing tape, or rewrap bundles that were opened unnecessarily. They must be sterilized again.

Store linen supplies away from solutions. This holds for storage in cabinets and for extra linen held ready during an operation. Sterile packs must be stored on shelves above those containing solutions (catgut,

antiseptics).

1. Prevents the possibility of supplies becoming damp and, therefore, contaminated.
2. Saves time and labour of co-workers who have to re-sterilize the bundles you have carelessly handled.

Sterile supplies that fall to the floor must not be used, even though they are double-wrapped. The desired margin of aseptic safety is jeopardized.

It is preferable to lay for each operation as the schedule moves along. However, if it is the practice to lay trolleys for more than one patient at a time, keep these sterile set-ups in another room, away from traffic.

1. Prevents cross contamination from patient to patient.
2. Prevents accidental contamination in congested area.
3. Minimizes hazard of unrecognized contamination.

Shake out soiled linen before placing in laundry bin.

1. To prevent loss of equipment.
2. To prevent cuts or other injuries to laundry workers.

Respect linen in septic procedures

1. Assemble extra, possibly needed, supplies outside of operating theatre. (Saves re-sterilizing unused linen.)
2. With used supplies, carry out the special precaution procedure established at the hospital. As a safety factor for patients, operating theatre staff, and laundry workers, this is indispensable.

Lengthen the life of linen items. *For example:*

1. Do not use good towels or pads for cleaning furniture.
2. Do not expose linen to unnecessarily high temperatures for long periods of time. Follow prescribed instructions.
3. After sterilized linen is used, send it to laundry even though it appears clean. Laundering replenishes moisture to the fabric, bringing the fibers closer together. If not laundered, but sterilized repeatedly, linen turns brownish and becomes porous and unsafe for use in surgery.

10 Instruments

Selecting Instruments for Operative Procedure

There are different ways to select and assemble a set of instruments for an operative case. One method you may choose to follow is to say to yourself: knife, scissors, forceps, clamps, retractors, and special needs. Another way is to visualize the operation step by step, and select the instruments in order of their use. The placement of instruments in the set must conform to the pattern established in your particular operating theatre. The type and quantity of instruments depends on the case at hand. The following information is to assist you in selecting the needed instruments.

Purpose of Instruments

Each instrument is designed to do a specific job. Their many variations are necessary to cope with the location, depth, and function of the anatomical structure. For efficient results, an instrument must be employed for the purpose for which it has been fashioned.

1. Knives (scalpels)
 - a. The commonly used scalpel is actually a knife handle used with sharp, removable, disposable blades. The handles may be short or long, and the blades vary (rounded edge, slanted point, narrow shaft, etc.), to accommodate the location and type of tissue to be cut. *For example:* the blade needed to excise a nevus would be of delicate design compared to the blade used for an abdominal incision on an adult.
 - b. Some surgical knives (e.g., cataract knives) are of one piece construction. Extreme care in handling this permanent blade is imperative to preserve the sharpness and avoid nicks: it must be meticulously inspected before use.

2. Forceps

- a. *Plain* forceps are non-traumatic in design. The tips may be blunt or tapered (the tissue involved determines your selection). The plain tips avert injury to underlying anatomical structures as well as trauma to the grasped structures. (They are used to pick up peritoneum, intestine, blood vessels.)
- b. *Tooth tissue* forceps enable the surgeon to grasp tissue firmly and at the same time exert tension. The teeth vary in number and length (the tissue involved determines your selection). Tooth forceps must be used with caution because of their traumatizing effect. (They are used on skin, scar tissue, muscle.)

3. Scissors

- a. *Heavy pattern* scissors are more efficient on resistant or dense tissue.
- b. *Fine* scissors are best employed on tissue requiring meticulous dissection.
- c. *Suture* scissors are designed to cut sutures. Other scissors are ruined if employed for this.

4. Clamps

The varied designs meet specific purposes. They may be used for haemostasis or to grasp tissue for retraction. The same safety rule applies to clamps as to forceps: the clamp with a tooth (Kocher, Allen, Ochsner) must be used with caution. Familiarize yourself with the selection of clamps available at your hospital and their possible usages.

5. Retractors

- a. *Usually used in pairs* to provide even exposure by walling off surrounding tissue.
- b. *Vary* in size, shape and flexibility to meet a given situation.
- c. *Special designs* for specific situations:

6. Instruments are manufactured in various lengths and widths.

Selection depends on—

- a. *Size of the patient* (baby, adult, obesity).
- b. *Depth* of the operative site.

c. *Doctor's preference.*

d. *Anatomy involved.*

Examine some instruments at random and visualize the areas where they could be used.

Number of Instruments

The factors that determine the quantity of instruments needed are:

1. Size of the patient (baby, adult, obesity).
2. Anatomy involved.
Will there be a large initial skin incision?
Will the incision be small and the entire procedure superficial?
Will the operation be in a very vascular area?
3. Condition of patient. *For example:*
 - a. Accident case. Debridement followed by orthopaedic surgery may require two separate set-ups of instruments.
 - b. Septic case. Guard against taking superfluous number of instruments into operating theatre and subjecting them to contamination.
4. Special techniques.
You need more instruments when the technique employed is to use an instrument *once* and pass it off for washing and re-sterilization (cancer technique).
5. Surgeon's preferences. *For example:*
 - a. If a surgeon uses diathermy for haemostasis, it may cut down on the number of instruments needed.
 - b. A surgeon who uses clamps for retraction may require an extra supply.

Passing Instruments at the Operative Field

The following points are basic considerations in handling instruments. These points can be correlated with the teaching plan of any institution. Practice in spare moments to attain speed and dexterity.

1. Use both hands. Time is saved by coordinating motion of both hands.
 - a. Hand near operative field passes most of the instruments to surgeon. Have only one kind of clamps in your hand at a time. (Prevents loss of speed while switching to desired clamp, avoids confusion, and unnecessary hazard.)
 - b. Hand near sterile table (1) is free to receive used instruments from the operative field, cleanse and replace instruments on table, (2) resupplies stand above operative field, and (3) can pass a newly requested instrument not in your other hand.
2. Place instruments gently but firmly in surgeon's hand. Keep hand low and convenient to operative field.
 - a. Your hand is on same level as surgeon's.
 - b. Your motion is smoother.

Do not dangle instruments near surgeon's hand.

 - a. Surgeon does not want to take his eyes from the operative field to receive instrument.
 - b. Time is wasted when the passing of an instrument is not deliberate.
3. Although sterilized with ratchets opened, clamps should be closed on first notch of ratchet before passing them to surgeon.
 - a. Keeps instrument from becoming tangled with other instruments.
 - b. Easier for surgeon to open instrument.
4. Assist surgeon's speed of operation when passing an instrument. The handle must be free to place in his hand, and the tip must be free for action.
 - a. Pick *clamps and scissors* up at the joint, forceps at the fused end, and retractors by the center portion, using thumb and index finger. Thus, handle and tip are exposed.
 - b. Pick scalpel up by the handle (just beyond the blade) with four fingers on one side, thumb on the other.
5. Protect the surgeon and yourself from injury from sharp instruments.

- a. When not in use, keep scalpel on instrument stand. If left on field it may fall to the floor (or on your foot), or surgeon may reach for a sponge stick and accidentally grasp cutting blade.
 - b. Never allow your hand to be beneath the scalpel blade, nor carelessly point knife where surgeon may accidentally strike blade.
 - c. Exercise caution when handling instruments with hooks and prongs. These may “prick” glove or penetrate through sterile drape.
6. Keep instruments clean.
 - a. Clamp is inefficient with tissue adhering to tip.
 - b. “Bloody” clamp adheres to surgeon’s glove.
 7. Change knife blades in direction away from field.
 - a. Your hand may slip—blade could fall into wound or among instruments.
 - b. Prevents unnecessary hazard to all concerned.
 8. Instrument, knife blade, or needle that picks or tears glove must be discarded.
 - a. Change glove—contaminated.
 - b. Discard instrument, knife blade, or needle—contaminated.

Pass Proper Instruments at Proper Time

To be able to pass the proper instrument, you must keep your eyes on the operative field. This is the only way you can estimate the surgeon’s needs. It enables you to keep up with unexpected changes or emergencies. Everyone knows this is the answer, but few have mastered the art. Nurses continually give more attention to the sterile table than to the operative field. The number of instruments, sutures, and supplies becomes overwhelming. Why? They are not always put in the same place and the nurse keeps looking or rearranging to be sure where they are. This practice can be eliminated by routine set-ups.

Once habit patterns are established, the use of the complete set-up becomes automatic. You can then reach to the sterile table and pick up the desired article without taking your eyes away from the operative field.

Care and Storage of Instruments

Proper storage and care of instruments prolongs their usefulness.

1. Clean thoroughly after use.
 - a. Removal of tissue and excretions must be complete before sterilization.
 - b. Sterilize instruments after use before storing, to protect staff.
 - c. When instruments are not in use, all surfaces must be dry to prevent rust.
2. Sterilize instruments according to institution's and manufacturer's recommendations.
 - a. Instruments must be sterilized with ratchets opened. (Specially designed pins hold instruments open and yet in place in baskets; after sterilization, pins can be removed at instrument table.)
 - b. Institution sets specific time limits and methods of sterilization. Be accurate in following regulations.
 - c. Manufacturer advises when specific methods of care must be adhered to. These promote safety in care of instrument.
 - d. The safety practice (as with linen packs) of placing an indicator in the instrument basket can be an additional instant alert to a malfunctioning autoclave.
3. Do not misuse or abuse instruments.
 - a. All surgical instruments are precision instruments and must be treated accordingly.
 - b. Prevent damage to dropped instruments by picking them up immediately; they are easily stepped upon and broken.
 - c. Sharp or fine-edged instruments (e.g., osteotomes, tenotomy knives) are more delicate than other instruments and must have special attention. Store and sterilize carefully.
 - d. Instruments designed for ophthalmic or plastic surgery are taxed beyond their purpose if used in general surgery. The strain renders them useless in future special work.
4. Prevent careless loss of instruments.
 - a. Shake out linen before placing it in laundry sacks.
 - b. Remove clamps from specimens going to laboratory, unless

- otherwise specified.
- c. Record instruments loaned to wards, and those going back with surgical patients.
 - d. Instruments having numerous parts should be carefully handled. When stored, they must be checked for completeness.
5. Repair instruments at first sign of defect. The repair will cost less, and patients and doctors will not be subjected to imperfect instruments.
 6. Return instruments to proper place when not in use. This saves time for the staff and facilitates inventory. Also, it helps the new nurse to realize extent of instrument supply and the novice to learn names of instruments.

11 Sterilization

What does sterilization mean?

Sterilization implies the destruction of all forms of microbial life. An article can therefore only be regarded as sterile when all micro-organisms both on its surface and in its substance have been killed.

Disinfection is used to describe the process by which many of the more common pathogenic (disease-carrying) micro-organisms are killed.

How easily can these harmful organisms be destroyed?

Some micro-organisms can be destroyed comparatively easily, e.g. cocci, bacilli, fungi.

Others are more difficult to destroy, e.g. some viruses.

The greatest problem of all is the destruction of the resistant spores formed by some organisms e.g. tetanus bacilli, gas gangrene bacilli.

What methods are available

1. Heat.

Heat is conveyed to articles in two ways: –

A. In water or water vapour (steam). **MOIST HEAT.**

B. In the air surrounding the articles. **DRY HEAT.**

Of these two Moist Heat is preferable since

a) Dry Heat penetrates more slowly.

b) Micro-organisms are more resistant to dry heat.

2. Chemical Agents

These are available in two forms: –

A. In solution.

B. As a vapour.

3. Gamma Radiation.

Gamma rays produced from a radioactive source such as Cobalt 60

are used to bombard the articles to be sterilized. Because their wavelength is short, they will penetrate most substances and bacteria are destroyed by a process known as ionisation. Most equipment which will not withstand heat or chemicals can be sterilized by this method, such as plastics made of polythene and nylon; they can be pre-packed and sterilized and most are now disposable.

Practical application of these methods

Heat

Heat is the best method of sterilization available in Hospital.

A. Moist Heat

1. Boiling

- a. The boiling point of water at normal atmospheric pressure is 100°C (212°F)
- b. Boiling water will destroy most common non-sporing organisms in 5 minutes.

Spores are not killed at boiling. Therefore material containing spores cannot be sterilized by boiling water since the spores will survive the process.

- c. When boiling is used as a method of sterilization we rely on the fact that spores are not present.
- d. All the surfaces to be sterilized must be in contact with the boiling water:—
 1. they must be free from contamination which would prevent the water reaching surfaces — hence instruments and bowls etc. must be scrubbed under running water.
 2. They must be completely surrounded by and immersed in the boiling water.

Most metal instruments and equipment made of metal can be sterilized in this way, though delicate instruments can be damaged.

2. Autoclaving (as applied to instrument and bowl sterilizers).
 1. This process uses steam under pressure to sterilize articles.
 2. Steam is itself a more effective sterilizing agent than water

at 100°C since it retains the latent heat necessary to convert water at 100°C to steam. This is released when the steam condenses.

3. The pressure in an autoclave chamber is used to raise the temperature of the steam even higher.
4. At 30lbs per square inch a temperature of 135°C (275°F) is reached.
5. Like boiling water, the steam must be in contact with all the surfaces to be sterilized. Air surrounding or trapped inside the articles would prevent this in the same way as would contamination of any sort. Thus
 - a. The articles must again be scrubbed under running water.
 - b. Since the steam entering from the top of the chamber displaces the air in its downward passage, articles must be packed in such a way as to enable this to occur satisfactorily.
6. In the bowl and instrument autoclaves the pressure attained is 30lbs. per square inch and the temperature 135°C (275°F). This is held for 3 minutes. A Browne's tube indicates by a colour change from red to green that the correct temperature has been held for the correct length of time. It is therefore vital to put a Browne's tube through with each load as a check.

Dressings and fabrics present a slightly different problem, for in order to sterilize them the steam must penetrate the material itself. If air remains in the pack, the steam will mix with the air, the temperature of this steam/air mixture is lower than that of the steam and its efficiency as a sterilizing agent is therefore less.

High vacuum autoclaves in which the air is first drawn from the chamber and the load itself are used. Thus complete and rapid penetration of the steam can occur and the temperature throughout the load will be constant. The time taken for a load to be sterilized by exposure to the steam is carefully calculated and controlled according to the type of materials constituting the load and their ability to withstand heat. Finally, a vacuum is drawn to dry the load.

3. Pasteurization.

This is not strictly a method of sterilization, since it does not kill all forms of microbial life. Most vegetative bacteria are, however, destroyed by this method.

1. The articles to be treated are immersed in water whose temperature is maintained at 75°C by means of a thermostat.
2. The time taken to destroy most pathogenic organisms at this temperature is 10 minutes.
3. Distilled water is used so that lime is not deposited on the instruments during their immersion.

Examples:— Cystoscopes are treated in this way since:—

- a. Water at 75°C does not damage them.
- b. The organisms commonly responsible for urinary tract infections are destroyed by this means.

B. Dry Heat.

1. The hot air oven is a thermostatically controlled heated cabinet.
2. The method depends upon the facts
 - a. That heat will be conveyed by the surrounding air to the articles to be sterilized.
 - b. That the articles themselves will also attain this temperature.
3. Time has therefore to be allowed for warming up and this will clearly vary according to the size of the articles for sterilization.
4. When the load has reached 160°C (320°F) the exposure time is 1 hour.
5. Since it is difficult to ascertain that penetration has occurred, Browne's tubes of a type designed to change under these conditions are used with each item. These are checked when the container is opened.
6. The advantage of this method is that sealed containers can be used.

Examples:—

- a. Fine instruments such as those used for eye surgery can be packed into their trays before sterilizing.
- b. Glass syringes, these need not be dismantled before sterilization.

- c. Instruments having oiled moving parts eg. drill motors, dental handpieces etc. Oil cannot be penetrated by steam.

Chemical Agents

Sterilizing by means of chemical agents should only be resorted to if it is impossible to use heat.

1. Heat is the best method of sterilizing.
2. Chemical substances all have to be rinsed off, thus adding the danger of re-contamination.

Solutions

1. Formalin is an aqueous solution of formaldehyde. This also contains:— Phenol, Borax, Fluorescein, and water.

Formalin solution destroys non-sporing organisms in 15 minutes, spores after 6 hours.

The solution is intensely irritant and must be rinsed off articles before they come into contact with the patient's tissues.

Sterile water or Isopropanol is used for this purpose. Cheatle forceps and suture needles are stored in this solution.

2. Glutaraldehyde

This belongs to the same chemical group as formaldehyde, it is less irritant and more rapidly effective than formaldehyde however.

Most bacteria are destroyed after 10 minutes in Glutaraldehyde.

Spores are killed after 3 hours.

Uses:— Cystoscopes.

Laparoscopes.

3. Chlorhexidine (Hibitane).

This solution is used in the concentration of 0.5% in 70% alcohol. It destroys most pathogenic organisms after 3 minutes but is ineffective against spores.

Uses:— for suture needles
fine instruments.

4. Suture solutions

These solutions are produced by the manufacturing firms especially for the storage of their own packets of suture materials.

Three requirements are satisfied:—

1. The solution does not damage the packet.
2. The specific gravity of the solution is such that the packets neither float nor sink but remain in suspension in the fluid.
3. The solution is sporicidal.

The correct solution must be used for each different manufacturer.

The time taken for sterilisation is 18 hours.

Most sutures are nowadays presented in 'overwrap' packages, the whole packet and its contents having been sterilized by Gamma irradiation, and provided they are not opened until required, it should not be necessary to re-sterilize packets in future.

Gases

Ethylene Oxide.

This vapour, in order to sterilize effectively has to be used under rigidly controlled conditions of humidity and pressure. If the humidity is not sufficiently high, the available water vapour is absorbed by the load, leaving the ethylene oxide in a dry atmosphere. The gas is ineffective under such conditions.

The gas will penetrate such fabrics as paper, and so equipment can be wrapped in paper before processing.

Special tape is used to indicate adequate exposure to the gas. Some substances such as rubber, absorb the ethylene oxide and time must be given for the gas to disperse before using the equipment which has been sterilised in this way.

Examples:— Embolectomy catheters.
Cardiac pacemakers.
Cryotherapy electrodes and probes.
Heart valve prosthesis.

Large pieces of bulky equipment, eg:— respirators, incubators and suction machines may be *disinfected* by allowing them to cycle for 24 hours in an atmosphere of 10% ethylene oxide.

12 Suture Material

Suture is defined as the act, or operation of uniting parts by stitching, as in surgery, or the thread or other material used in the operation. Here suture is discussed as a thread or other material.

Selection of sutures tends to confuse operating theatre nurses. Confusion sets in when the nurse thinks only of "what will a certain surgeon use for a certain procedure" rather than "what suture material is qualified to meet the demands of the anatomy involved or the procedure proposed." The nurse's anxiety will be eased if she understands the purpose and accepted use of suture materials in general.

Identifying Suture Material

Companies vary in the processing and packaging of sutures. They label each suture with identifying company code numbers, type and size suture; if a needle or needles are present, they describe (cutting, taper, etc.) and usually illustrate them; they state whether or not it is a sterile packet; they list the components of solutions in which sutures are stored.

It will add to your education and your performance, if you take time to examine the boxes, jars, and packets, and note the information on the labels. Some will state "general closure" "ophthalmic," "gastrointestinal," etc. on the label, which assists in correlating type and use of sutures. For example, you will note the ophthalmic sutures have cutting needles, while gastrointestinal sutures have taper needles.

Because of the large variety of available sutures (one type may be supplied with various sizes and kinds of needles), each one is given a special code number. Today, it is becoming increasingly necessary to learn code numbers in order to facilitate quick selection from the shelf.

Classification of Suture Material

1. Absorbable sutures
Non-absorbable sutures
2. Types
Catgut, silk, thread, wire, tantalum, nylon, etc.
3. Non-boilable
Boilable

Size and Tensile Strength of Suture Material

All sizes and tensile strengths are standardized by suture manufacturing companies according to specific regulations or standards.

Size denotes the diameter of the material.

Tensile strength denotes the amount of pull that may be exerted on the strand before it breaks. Each size mentioned heretofore has a particular tensile strength. The finer the suture, the less tensile strength. Different materials have, of course, different tensile strengths.

Available Suture Material

Hospitals standardize the sutures kept in stock. The many varieties and sizes of sutures make this economy imperative. When a suture that is not stocked in the operating theatre is requested, report this request to the supervisor. There may be a similar suture available that can be substituted. If, however, the requested suture becomes actively used, it will be ordered. An outmoded type will probably be discontinued at the same time to prevent hospital funds from being tied up.

1. Know suture material stocked by hospital. No time will then be lost during procedure by requesting a non-stocked material.
2. Know which sutures are stocked in sterile form and which are not, so that they are sterilized before use. You need to know this for correct preparation of a case.
3. Report to supervisor a surgeon's request for suture material not

stocked by hospital.

Commonly Used Suture Materials

<i>Name</i>	<i>Absorb- able</i>	<i>Desirable features</i>	<i>Comments</i>
Silk	No	Pliable Ends can be cut close to knot Does not dissolve prior to wound healing	Loses tensile strength when autoclaved too often, or exposed to moisture
Linen thread	No	Economical	Low tensile strength Moderate tissue reaction
Plain catgut	Yes	Easily absorbed Minimal tissue reaction (but more than chromic)	Non-boilable Used especially for lesser vessels and in subcut- aneous tissue.
Chromic catgut	Yes	Slower absorption Minimal tissue reaction	Non-boilable Used to ligate larger vessels and suture deeper tissues
Nylon (monofila- ment)	No	High tensile strength Permits uniform approxi- mation	
Wire (steel)	No	High tensile strength Non-irritating to tissue	Difficult to tie May prove uncomfortable, when used as skin suture

Sterilization of Suture Material

With the innovation of sterilizing methods Gamma Irradiation (ethylene oxide, etc.) employed by suture manufacturers, more and more sutures (both non-boilable and boilable) are delivered as sterile pack. This is not only a time saver, but, again, a safety feature for sterility and usefulness of the suture.

Non-boilable suture. Supplied in glass tubes, foil or plastic packets.

Wet-pack usually indicates packet must be sterilized by soaking in special suture solution (similar to glass tubes).

1. Use only the suture solution supplied by the manufacturer. Other solutions might penetrate the plastic or rust the foil. If sterilizing solution penetrates packet or cracked glass tube, the enclosed suture material is unfit for use.
2. Suture must be completely submerged during sterilizing period.
3. Check carefully the length of sterilization time advised by company.
4. Check on stored suture and replace evaporated solution.

Dry pack does not need soaking. Outer plastic cover is peeled away, revealing an inner sterile suture packet. Exercise care in handling.

1. Examine cover for hole or defect.
2. Open carefully to prevent contamination of inner packet.
3. Open only the amount you need, as the inner packet has to be reprocessed (sometimes by the company).
4. Store in a dry area, away from spillage of solutions.

Boilable suture. Boiling water is not considered a foolproof sterilizing method, and high pressure autoclaves have replaced water sterilizers in most hospitals. The term "boilable" is now accepted to refer to the capability of the suture material to withstand heat (autoclave).

1. The sterilization time is governed by the temperature and pressure in the autoclave.
2. Constant sterilization by this method deteriorates some suture materials (silk, cotton).
3. Suture materials must be properly prepared.
 - a. Autoclave only the amount necessary for use.
 - b. If silk or thread is supplied on a spool, wind small quantities loosely on reel to allow for expansion of strands by moisture and heat.
 - c. Wind small quantities of wire on reels. Sterilization of inner layers of wire on spools wound thickly is questionable.

Storage of Suture Materials

Store all suture material in the same area, but segregate the various types to facilitate inventory and promote speedy selection:

1. Either by use (ophthalmic, cardiovascular, general closure, etc.)
2. Or by type (silk, catgut, wire, etc.)

Whatever system of grouping is used, put sizes in order.

Store suture jars containing solutions away from excessive heat and direct sunlight.

Rotate material so that older suture will be used first.

Basic Considerations

1. With the advent of dry, sterile pack sutures, manufacturers have generally discontinued supplying sutures in glass tubes. Reference is made to the old type, in the event they exist in your operating theatre.
2. Inspect glass tubes for cracks, and for discoloration of material or solution. Inspect foil or plastic packets for "splits" in seams.
3. Exercise caution when handling glass tubes. (Splinters of glass can be disastrous to patient, your gloves, and you.)
4. When using sterile forceps to deliver suture to table, do not pierce packet. Place sutures in specified area, so sterilizing solution will not wet the sponges and injure the patient's tissue.
5. Note immediate return of plastic reels. Avoids possible loss in wound.
6. Do not open sutures too much in advance. Long exposure to air can dry catgut.
7. At operative field, hold suture packet at the border and in a direction away from the *operative wound* and *your eyes*. Careless pressure on the center of packet containing solution (in the case of catgut suture, for instance) will squirt the solution into the wound or your eyes.
8. Dragging your fingers tightly along catgut strand, or careless handling in suture towel tends to fray the fibers and weaken the suture. Discard frayed sutures.

9. Remove kinks and curls from suture before passing to surgeon. To straighten catgut, gently let it slip through your hand, and then pull gently.
10. After passing a suture to the surgeon, have scissors or clamp ready for his use.
11. Length of suture depends on depth and accessibility of operative site.
12. Have regard for cleanliness of theatre. Do not throw used strands or packets on the floor.
13. Always know what size suture you are handling. Keep each size separate. Standardize locations of materials. *Habit pattern* prevents confusion and increases your speed. Be sure surgeon knows what size or type suture you are giving him.

In selecting sutures there is no hard and fast rule to follow. The preceding information, correlated with the type of body tissue and the condition it is in, determines the type and size suture selected. *For example:*

1. The suture material needed to tie the cystic artery (a large vessel) must be strong, and ought not be absorbed before the vessel is securely sealed. Chromic catgut has this quality. The surgeon is working in a deep cavity, so your suture must be long and withstand considerable pull. Size 0 or size 1 chromic in half length would answer these needs.
2. A patient may have a recurrent hernia. The surgeon may request wire in view of this repeated hernia. (It is strong and is not absorbed.)

For practice, think of a particular operation. Attempt to determine the sizes and types sutures required by the tissue involved, vessels encountered, etc.

Each surgeon's ideas on this subject have been formulated by training experience, and research. They will vary, but his choice is founded on principles. A nurse must adapt to the variations in practice.

13 Suture Needles

Needles are used for the placement of sutures. Selection of needles for surgery depends upon the type of tissue involved, the approach to the area, whether intricate or accessible, and the personal preference of the surgeon.

There are three parts to a needle: eye, body, and point. Any one of these parts may vary in design to adapt the needle to a particular tissue, or serve a special purpose.

The Eye

1. Eyed needle

- a. Shape of the eye aids in identifying the name of the needle, and suggests its use. (A thin oblong eye is found on intestinal needles, while a needle designed for fascia or muscle usually has a heavy rectangular eye.)
- b. Size of the eye must conform to the diameter of the suture material.

Narrow eye. Designed to accept fine gauge suture. Diameter of suture material must not be larger than diameter of eye. This prevents fraying of suture material. *Wider rectangular eye.*

Designed to accommodate larger gauge suture material. Do not use with fine gauge suture material, as it would result in unnecessary tissue trauma.

2. Split eye (French eye) needle.

On close observation you will note the eye is actually two fine prongs (split at the end). Surgeons like it for suturing with fine silk in intestinal work, as it is less traumatic in results, more like a fused or swaged needle.

3. Swaged needle (referred to as *atraumatic* needle)

Suture material is fused, or swaged, to needle. There is no eye.

- a. Diameter of suture is about the same as that of the needle – thus less trauma to tissue.
- b. Time saver. The needle and suture are ready for use.

The Body

The body (or shaft) is the main portion of the needle.

1. The body may be straight or curved. The curves may form 1/2 of a circle or 3/8 of a circle, etc.
2. The body may be round or have a cutting edge.
3. The body may taper, from a large diameter to a smaller diameter.

The Point

This is the tip of the needle.

1. Taper point. The body of the needle, from its largest diameter, gradually tapers to a sharp point.
2. Blunt point. Designed to pass sutures around vascular or poorly exposed areas.
3. Trocar point. Triangular cutting edged point.
 - a. Easily passed through tough tissue.
 - b. Not used on friable tissue.

Use of Needle Holder with Needle

A needle holder is an instrument to hold the needle firmly in place for suturing. To adapt to the suture area and needle design, the holders are made in various patterns of weight, length, and tip construction.

To choose location of holder on needle, use these facts as a guide.

1. If holder is placed on or too close to the eye (a weak part of the needle), the needle will break.
2. If placed too far down the shaft, you limit the passage of the needle through the tissue, causing a delay in suturing.

3. Place it a little below the eye, allowing about 3/4 of the needle free.
4. Place needle near tip of holder to facilitate suturing.

Choice of correct needle holder.

1. When fine needles are used for intricate work, use a needle holder with a lighter pattern tip. Too heavy a design tends to exert needless pressure on the needle causing it to break.
2. The opposite is true, when using a heavy muscle needle. A delicate pattern needle holder will be ruined by hard use.

Threading a Needle

Eyed needle

Thread from inner curvature to outer curvature.

The short end or "tail" of thread varies in length. Observe surgeon's use of suture.

If suture is difficult to thread, cut the end diagonally.

Less likely to become unthreaded, as there is less stress on the outer curvature.

Suturing in deep inaccessible areas requires a longer "tail" (approx. 4 inches). But in exposed areas, with interrupted sutures, usually 2 inches is sufficient.

This provides a point that will slip into needle eye.

French eye needle

Rule for determining length of short end is the same as for eyed needle.

Reason for threading at short end of suture, not the center.

Check prongs for working order.

It is threaded by holding the short end of the suture under tension and pressing the side of the strand between the prongs.

The prongs may fray the suture material and weaken it.

Constant placing of suture material into eye tends to weaken the prongs.

Basic Considerations

1. Do not use defective needles.
 - a. Points are dulled by use. Curves become distorted by hard use.
 - b. Inspect for nicks, burrs and corrosion.
 - c. Inspect swaged suture for weakness at point of fusion with needle.
2. Count needles on set-up before and after operative case. The count must tally. Inquire from your supervisor what is done in the event a needle is lost. (It may require X-ray, written reports of incident.)
3. Always see to the *immediate return* of the needle. This holds for the eyed, i.e., free, and swaged types.
 - a. Prompt recognition of loss is repaid by prompt recovery of needle.
 - b. Avoids complicated search (in wound, on table or floor).
4. Needles when not on needle holders, must be securely located in a specific area.
 - a. Prevents accidental sweeping of needles into operative wound.
 - b. Speeds handling because of the definite placement of needles.
5. Always have at least two needles of the same type on set-up. This prevents time loss while suturing.
6. When needle pricks glove, discard needle and change glove.
7. Have circulating nurse pick up needles that drop to floor. Accurate check for lost needle is impossible when theatre may have a needle from preceding case on the floor.
8. Needles used in septic part of case should not be used for closure of wound. *Examples:*
 - Total hysterectomy – vaginal vault needles may be considered contaminated.
 - Intestinal suturing – needles used on mucosa are considered contaminated.
 - Bronchial Suturing – needles used are considered unsterile.

Care and Storage

1. Needle must be clean and free from tissue and blood prior to sterilization.
2. Sterilize needles before and after use.
 - a. Protects the patient.
 - b. Protects person handling needles after operation.
3. According to standard procedure at your hospital, soak in non-corrosive sterilizing solution, or autoclave.
4. Store in dry place to prevent rust.
5. Store needles of same type and size together.
 - a. Segregation speeds selection.
 - b. Facilitates inventory.

14 Mental Line-Up

Prior to starting a procedure, you must *assemble yourself mentally*. This process is going on well before you get to the field of operation. Preparing the sterile set-up is only half the story.

Read your case assignment and take time to *think*. Do you know. . .

1. The anatomy involved?
2. The approach of the operating surgeon?
3. The approved technique of the hospital?
4. The professional capabilities of the nurse you are working with?
5. The general condition of the patient?
6. The emergencies brought about by the procedure?

Knowledge of these six points equips you for every type of surgery — from minor incision and drainage or change of dressing to complicated and lengthy procedures. The result of this mental line-up is that you conserve time, eliminate last minute running, establish the doctor's confidence in you, and help achieve the ultimate goal — good patient care. These six points concern the suture nurse and the circulating nurse. Both must think along these lines. Each must be aware of the total situation and ready to aid the other.

Know the Anatomy Involved

Basic anatomy must be understood to carry out any nursing procedure; in the operating theatre it must be mastered. This knowledge of anatomy is the key to your success. Which instruments, drugs, sutures, sterile supplies, and extra equipment are required is partially determined by anatomical considerations. Before an operation, take time to consider the anatomy involved and to anticipate and assess the problems present when dealing with these structures. *For example:*

Pneumonectomy. Positioning the patient for surgery is dependent upon anatomy. Pneumonectomy requires the patient to be on his side. Thus, you need to have the proper supports to achieve this position, and to prevent pressure areas. The lungs lie within the rib cage; so you realize that a rib, or ribs, will have to be removed before the pertinent area of surgery can be exposed. For rib resection and retraction, special bone instruments must be added to the set. You visualize the attachment of the lung to the bronchus and the vascular supply of the lung; consequently, to cope with the depth and position, you add long instruments with particular angles, and you are reminded that sutures must be long, and needles of fine caliber, for delicate areas. The heart is also within the same cavity, and stimulants may be necessary. A negative pressure exists within the chest cavity; when the chest is opened, this is destroyed. Therefore, after certain types of lung surgery are concluded, the negative pressure must be re-established, a reminder to you of special tubes or drains to connect with an underwater seal.

The following examples list only one highlight. Think of the other considerations for each case.

Mastectomy. Very vascular area. So have many extra clamps on hand.

Hysterectomy. Ligation of uterine vessels is necessary. A curved clamp is desirable in view of the anatomical location.

Bone plating. Select plates, screws, and bone holding forceps in relation to bone involved. For the same procedure, a fractured femur and a fractured humerus would require different sizes.

Eye work. The eye structures are so small and delicate that the tiny instruments must be minutely examined for presence of burrs or defects.

Approach of the Surgeon

Each surgeon has his own method of doing a routine procedure. Learn his method so you will be an efficient assistant. *For example:*

1. Have favourite instruments in set-up. Many surgeons use instru-

ments they have purchased themselves, and want them included in each case.

2. Have the needles the surgeon prefers.
3. Does the surgeon use silk, cotton, or catgut? Check this and have his choice available.
4. Will the surgeon desire the use of diathermy?
5. Will the surgeon drain through a stab wound or the incision?

Approved Technique of Hospital

You must familiarize yourself with the approved technique as quickly as you can. You will learn the standards from the operating theatre supervisor, the senior nurse, and the operating theatre precedent book. Those standards have been devised by the hospital to assure approved and excellent patient care. You must do your part to maintain these institutional standards. *Example of some hospital policies are:*

1. *Cancer technique.* Use clamp once, then have it washed and re-sterilized.
2. *Orthopaedics.* Double glove technique for skin incision.
3. *Lost sponge or broken needle.* X-ray of patient required, and incident report sheet to be filled out.
4. *Sponge and pad count.* Hospital approved method.
5. *Towels and operative skin preparations.* Hospital approved method.
6. *Sterilization.* Method and time required, autoclaving, or chemical disinfection.
7. *Consent forms.* Proper forms signed, witnessed, and dated.
8. *Septic or contaminated cases.* Hospital approved procedures. Apply basic knowledge of bacteriology while carrying out these nursing duties. This will enable you to be intelligent about your work, eliminate cross-contamination, and protect your own well-being.

Professional Capabilities of Nurses on Team

Each team member is dependent upon the other team members for smooth execution of the operation. Time and many anxious moments are saved when you know someone's capabilities. You are then prepared to foresee or remedy a situation through supervision of operating theatre techniques and skills.

1. Is the nurse you are working with familiar with the procedure and general course of the operation?
2. Does she understand the importance and the system of taking the sponge count?
3. Does she know where the emergency equipment is kept, and how to use or prepare it for use?
4. Is she aware of her responsibilities to the patient, doctor, anaesthetist and suture nurse?
5. Will it be necessary to have an additional person present to aid this nurse, so that her participation will be a learning experience, but not at the expense of good patient care?

Know Condition of Patient

The patient's condition affects every situation. There are "routine" methods to set up an operating theatre, but there is never a "routine" patient. Various considerations are:

1. *Emergency work*, such as accidents and acute illnesses (ectopic pregnancy, perforated ulcer, evisceration), requires rapidity in assembling the operating theatre.
2. *Obesity* requires additional instruments ready on the tray. The presence of excessive fat necessitates the use of broader and deeper retractors for exposure, and of long-handled instruments to reach underlying structures.
3. *Poor operative risks*, i.e., cardiac patients, asthmatics, elderly persons, alcoholics, require supplementary operating theatre preparation. Emergency drugs with syringes and needles of proper size; additional nurse power to meet the requests of surgeon and

anaesthetist; availability of tracheostomy set, cardiac resuscitation and intravenous cut down set.

4. *Apprehensive patients* require understanding and constant reassurance. Always remember, *no patient should be left unattended in the anaesthetic room.*
5. Notify recovery room or ward when special equipment is needed for post-operative care – fracture bed, suction, oxygen tent, hypothermia unit, etc.

Emergencies Brought about by Operation

Every procedure in an operating theatre has a potential for emergency. Analyze each circumstance and remember that “emergency” means something other than hemorrhage. *Example:*

1. A thyroidectomy may require a tracheostomy if tracheal obstruction or compression occurs.
2. Nasal fractures may require a Caldwell-Luc operation because of bone fragments in the antrum.
3. Dental cases need two suction set-ups. Bone fragments may plug one suction, another must be available to guard patients against aspiration.
4. Patients under local anaesthesia must be observed for adverse reaction to drug, e.g., profuse sweating, tremor, syncope, thready pulse, change in blood pressure.
5. An inflamed appendix may rupture during the removal and contaminate the field.
6. During a dilatation and curettage, the uterus may be perforated, and an abdominal operation may be necessary.
7. Always check resuscitation apparatus before caesarean section. The infant’s life may depend upon mechanical establishment of respirations.
8. Patients in prone position under anaesthesia depress their respirations by their own body weight. Correct positioning helps reduce this surgical risk.

15 Four Clue System

We have now reached a point at which we should refer concisely to operating theatre *procedure*. It is impossible to teach anyone every single step of every operative procedure (there are hundreds) and every possible deviation from routines in each procedure. What you will have to do, before you “scrub” for a case, is to study the operation by reference to surgical books and conference notes, and to develop a method of thinking that prepares you for deviations in routines, new procedures, and complications that may arise.

The foregoing chapters described the over-all operating theatre picture. Now let us concentrate on solving the procedure, from the selection of instruments to the application of the dressing. There are *four clues* that will help you solve the problem and make you a secure member of the surgical team. The clues must be used in the sequence given. As you proceed, visualize each answer.

Clue 1. *Surgical approach*

How will the area involved be exposed? Ask yourself what position will be necessary to reach the operative area, how position will be maintained, what must be done before, e.g., the appendix is removed, or the dilatation and curettage is performed.

Clue 2. *Surgical procedure*

Area is now exposed. What are the steps of the procedure at the operative site? What will you need to do during this phase?

Clue 3. *Surgical complications*

Ask yourself what unforeseen difficulty may arise at the operative area that may require additional sutures, set-ups, or special equipment? How will you prepare for the various complications?

Clue 4. *Surgical closure*

Anatomical layers are to be closed, dressings to be applied. Ask yourself how the wound is closed, dressed. What will you need for

this?

Three examples in the use of the four clue system follow. The descriptions are not complete from a surgical standpoint, nor are they to teach surgical nursing; rather they are to inspire logical thinking.

Diagnostic Dilatation and Curettage

- | | |
|--|---|
| 1. <i>Surgical approach</i> (before the cervix is dilated and the uterus curetted) | <i>What you will need</i> |
| Patient in lithotomy position | Stirrups attached to table |
| Vaginal preparation | Receptacle, prep solution, sponges on clamps |
| Bladder catheterized | Catheterization set |
| Patient draped | Specifically designed drape |
| Vagina retracted, cervix grasped | Instruments (vaginal retractor, tenaculum) |
| 2. <i>Surgical procedure</i> | |
| Cervical os identified | Retractors, swabs |
| Uterus measured (depth) | Uterine sound |
| Cervix dilated | Complete set of dilators (small to large) |
| Uterus and cervix curetted | Opened sponge to receive specimen, sharp and dull curettes of various sizes |
| Curettings collected | Sponge with specimen carefully received |
| 3. <i>Surgical complications</i> | |
| Cervical tear | Forceps, needle holder, suture, scissors, Kelly clamp, sponges |
| Perforation of uterus | If abdominal operation is requested, have set-up available |

4. *Surgical closure*

Sponge vaginal vault	Sponges and sponge sticks
Apply perineal pad and cleanse adjacent area'	Perineal pad, moist towel

Choose a particular operation and go through these steps, visualizing what will be done, and think of how you would prepare to meet the demands: Theatre equipment, instruments, sutures, dressings, drugs, rubber goods etc.

Pyloromyotomy (as done for congenital hypertrophic pyloric stenosis)

1. *Surgical approach*

What will you need

Dorsal recumbent position	Shorten table (drop foot piece)
Infant secured to table	Bandage or tape
Surgical skin preparation	Skin preparation set and solution
Towel	Towels, sheets or special towel
Abdominal incision, subcutaneous bleeders clamped	Knife, scissors, forceps, clamps (all of delicate design), sponges (counted), ligatures
Skin towels applied	Skin towels (small pads— counted), towel clamps
Peritoneal cavity opened and stomach exposed	Clean knife, thumb forceps, scissors, clamps and Babcock clamp in readiness, retractors

2. *Surgical procedure*

Stomach grasped near pyloric ring and delivered into open wound; examined	Small moist pad, Babcock clamp
Incision into hypertrophied muscle	Delicate knife, swab
Muscle fibers separated until mucosa pouts through	Small curved clamp

3. *Surgical complication*

Accidental incision into
duodenum

Suture for closure or to hold
omental patch. Gastric tube will
be passed and attached to suction.

4. *Surgical closure*

Edges of peritoneum grasped
Peritoneum closed

Clamps, sponge and pad count
Forceps, needle holder, suture,
scissors and swab

Muscle and fascia sutured
Skin towels, if used, removed

Forceps, suture ligatures, scissors
Receive in receptacle
Sponges and pads recounted

Skin edges approximated

Cutting edge needles, sutures,
forceps, scissors

Dressings, or collodion applied

Gauze, tape, or collodion

The following example is a simple procedure, in comparison to others, but must be done within a limited anaesthesia period. The clues will be listed, can you supply the needs?

Change of Burn Dressing

1. *Surgical approach* (What will you need to do this?)

- Remove old dressings.
- Place in proper receptacle.
- Cover exposed burned areas with sterile towels or sheets.

2. *Surgical procedure* (What will you need to do this?)

- Remove sterile towels or sheets from area to be treated.
- Remove decayed tissue.
- Clean off drainage that has formed on good tissue. Skin graft may be desired.

3. *Surgical complications* (Can you meet these added surgical needs?)

- Infection (presence of pathogenic organisms)
- Shock

4. *Surgical Closure* (Are the needed materials in readiness?)

- a. Apply special moist or medicated dressings.
- b. Pressure dressing may be used, elastic bandages

Now check whether you thought of these needs:

1. The surgical linen pack or packets to set up the sterile table (sheets, drapes, towels, sponges, gloves, gowns, basins, prep cup).
2. Waxed paper bags for soiled dressings and disposal of decayed tissue.
3. Laundry bag.
4. Sterile saline for irrigation and for moistening of skin grafts.
5. Instruments (knife, scissors, forceps, short haemostats, swabs, delicate design needle holders, towel clamps).
6. Needles (special fine type to suture graft).
7. Skin graft equipment (Dermatome and blade, lubricant for skin and applicator to apply). Do you need an extra trolley to hold Dermatome?
8. Did you have special burn packs, bandage, and dressings on hand?
10. Equipment and disinfecting solution for procedure of caring for an infected theatre?

The three examples show you the way of logical thinking and its value, in the operating theatre. Instruments and sutures, linen, the drugs and solutions required, and extra equipment necessary have been selected by you through a process of visualizing the entire operation and recognizing the particular demands at every point. You have thought of "first things first," and you have not become "lost."

16 Responsibility to Anaesthetist

Although the activity of the staff is concentrated on the surgical procedure, it is paramount that the nurse also give considerable thought to her role in assisting the anaesthetist. The patient must not be subjected to more anaesthesia than is absolutely necessary. Since the body is not normally subjected to anaesthetic substances, more work is required to eliminate or break down these agents.

It must be emphasized again that the theatre must be in perfect readiness for the patient. A conference with the anaesthetist preceding the operation will alert the nurse to the requirements of the patient, and she will be in a better position to assist the anaesthetist in this vital role in surgery.

Anaesthetists usually have the special supplies they need in their machines, but they depend upon the nurse to see that the anaesthesia stands are correctly supplied (e.g., with syringes, airways).

1. Be sure supplies are replaced between operations.
2. Provide an area for placement of used supplies.

Gauze used to clean injection site is not confused with surgical sponge count. (A different size sponge and a separate receptacle for its disposal are advisable.)

At the end of the operation, items can be collected quickly for removal from theatre.

3. Be sure that suction apparatus is in working order.
 - a. A small basin of water may be required to clean suction of tenacious material.
 - b. All tubing and connections must be immediately available.
 - c. Deep tracheal suction requires sterile catheter technique.

Rules for Safety

Conductivity must be the rule at all times, even if the patient requires local anaesthesia, or if a non-explosive gas mixture is to be employed.

1. It assures continual safe practice through habit.
2. You are prepared for any unexpected changes in the planned course of treatment.

Sprays, e.g., adhesives or benzoin, must be used carefully.

1. Protect breathing mechanism of patient from inadvertent inhalation of sprays.
2. Protect patient's eyes from inadvertent contact with sprays.
3. Protect apparatus from gummy materials.

Do not use the anaesthetist's table or machine for placement of your supplies.

1. It encumbers his work.
2. It prevents quick access to his supplies.

Do not touch his machine during procedure without permission (explosive hazard).

1. Anticipate his requests by knowing the usual procedure and by observing the patient.
2. Know location of monitoring and defibrillating equipment and how to set them up.

At end of operation.

1. Remain with patient and anaesthetist.
2. Be aware of intravenous bottles, tubing and injection sites, and prevent accidental removal or breakage.
3. Move patient gently (when the anaesthetist gives permission).

Quiet Environment

There are several opinions as to whether the patient hears or remembers conversation during the stage of losing consciousness and during the unconscious stage. Some thoughts are worth consideration:

1. The patient is able to hear conversation during a certain phase of induction, and when emerging from anaesthesia. (He may be unduly apprehensive and alarmed, or he may be hyperactive.)

2. Therefore, some feel that softly spoken, encouraging words and explanations (e.g., "You will begin to feel sleepy; you are all right") reassure the patient, with the result that he will awaken with the same assurance.
3. All feel that external stimuli can destroy the effects of the pre-operative medication.

In any event, it is important that nurses and assistants be aware that the surgical patient experiences an emotional trauma whether he receives a general anaesthetic or a local one.

Basic Considerations

1. The scrub assistant should be in gown and gloves in readiness for an emergent procedure, as well as for the entrance of the surgeon.
2. The circulating nurse must be free to stay with the patient. (How can she do this if she has to tie your gown or open a pack?)
3. Await the anaesthetist's permission before touching the patient or exposing area for skin preparation.
 - a. You may evoke laryngeal spasm.
 - b. You may upset the course of induction and evoke unwanted reflexes.
4. During injection of medication for local anaesthesia,
 - a. Observe patient for adverse reaction.
 - b. Anticipate the possible need for additional medication to counteract toxic reaction.
5. Determine amount of nurse power and equipment needed during caudal or spinal anaesthesia. For example,
 - a. Caudal anaesthesia for hemorrhoidectomy may require you to flex the table and provide additional arm boards for a comfortable position.
 - b. A spinal for caesarean section may be administered with patient in a sitting position. Have stool ready to support feet. A spinal given for other surgery may need additional nurse power for quick positioning to prevent localizing of the anaesthetic drug. In hospitals where disposable sets are used,

- some anaesthetists record the lot number of the set on the anaesthesia record (medical-legal reference).
6. When no anaesthesia is required (e.g. in some hospitals certain examinations, cast changes or exchange transfusions are done in the theatre), be certain that assistance can be quickly summoned. For example, in an exchange transfusion of the newborn, an anaesthetist should be alerted in the event respiratory difficulty occurs.
 7. Be aware that acute emergency patients are perhaps the most poorly prepared for having an anaesthetic.
 - a. Such patients may have just eaten or taken liquids (aspiration possibility).
 - b. Following traumatic injury, the stomach does not empty in the normal time, often retaining its contents following injury.
 - c. Patient may be in poor health before accident; his medical history may be unavailable (he may be unable to communicate and no relative can be reached). Thus, there is the possibility of presence of cardiac or respiratory ailment.
 8. You may be assigned to record the type of anaesthesia and the time on the operative record.

Know How to Care for Anaesthetic Equipment

You may be requested to clean certain items. Know the physical properties of the equipment. For example,

1. Certain equipment cannot withstand high temperatures of steam autoclave.
2. When washing or disinfecting cuffed endotracheal tubes, do not allow solution to enter the special cuff.
3. If disinfecting solutions are used, be sure they will not cause skin irritation if the solutions are absorbed by the material. Check which disinfectant the anaesthetist prefers. Equipment must be thoroughly rinsed and dried.
4. If sterile tubes will be used in connection with the operative procedure (e.g., laryngectomy), prepare them properly according

- to hospital policy.
5. If gas sterilization is used, refer to hospital procedure for correct quarantine (aeration) of rubber goods to prevent burning.
 6. Machines must be clean before they are moved into the operating theatre.
 - a. Certain companies supply small tanks in plastic wrap to minimize dust. Remove covers, which can be an explosive hazard.
 - b. Do not attempt to clean a machine without proper instruction and permission. Oils and certain solutions can cause explosions and corrosion.
 7. Do not move a machine unless you are properly instructed.
 - a. Improper pressure on regulators, valves, gauges etc. causes dislodgement, gas leaks, costly repairs and possible explosion. Tightening valves excessively may break delicate parts.
 - b. Proper handling by rail handles on the machine prevents damage.
 8. Spinal needles and syringes, as for surgery, must be meticulously inspected; they must be sterile. This is not only to prevent infection, but to avoid nerve injury, paralysis, and death.
 - a. If tap water is used in cleaning spinal syringes and needles, foreign matter (minerals) that may be present will be extremely harmful to the patient. Use sterile distilled water.
 - b. Improperly correlated parts of needles will cause injury and delays.
 9. If spinal or block sets are prepared by the staff,
 - a. Avoid loose cotton, etc. (risk of foreign bodies).
 - b. Be sure swabs will not confuse surgical swab count.
 10. Medications (ampoules) are best autoclaved well in advance.
 - a. Solution must be cool.
 - b. Soaking ampoule is dangerous. (Unnoticed crack in vial may admit disinfectant which may not be recognized).
 - c. Labels must be legible.
 - d. Some medications may only withstand one autoclaving; e.g., glucose.

Absolute compliance with technique is necessary.

Definitions

Local. Infiltration into general area of operation without selecting a specific nerve to anaesthetize.

Topical. A properly buffered solution is applied to a surface (skin or mucous membrane).

Regional nerve block. Injection of solution of proper dilution into tissue in immediate proximity of regional nerve itself. This is more specific than local infiltration and affects the smallest area necessary to get the job done.

Caudal and Epidural. Injection of anaesthetic drug of proper dilution into the caudal or epidural space, bathing the nerves of the area covered. (There are fewer variations in blood pressure, no headaches, and breathing apparatus is less apt to be depressed.)

Spinal. Injection of drug of proper dilution into subarachnoid space, where it mixes with cerebral spinal fluid, bathing the spinal cord and nerves.

17 Admission of Patient to Theatre

The patient awaiting surgery undergoes great emotional stress. A person in apparent good health who requires a very minor operative procedure may be as distressed mentally as one seriously ill who is about to undergo lengthy major surgery.

Proper identification of the patient at all times is of paramount importance. This is a responsibility that cannot be overemphasized, and it is a responsibility of each member of the staff who has any contact with the patient.

Arrival of Patient in Operating Theatre Suite

Nurse receiving patient introduces herself.

1. Helps the nurse regard the patient as a person instead of a procedure.
2. Reassures the patient. He sees that personal interest is shown.
3. Meeting the patient gives the nurse an opportunity to note anything untoward in his condition that should be reported to the surgeon and the anaesthetist.

Charge nurse checks chart and patient.

1. Check name on chart with name on theatre list.
2. Check correlation of surgeon's name and diagnosis to that of theatre list.
3. Check patient's name on identification band or name tag secured to patient.
4. Check for presence of consent form (signed, dated, and witnessed). It is imperative that the hospital rules regarding operative permits be carried out. Hospitals vary in their requirements, but all permits are designed to protect the patient, protect the doctors and nurses, and to protect the hospital. Some considerations are:
 - a. Patient should write name in full (avoid initials). In the case of

a married woman, her first name (i.e., (Mary Doe) should be given, not her husband's name (i.e., Mrs. John Doe). Some procedures require the husband's consent also.

- b. A minor (under the age of 16) must have the signature of a parent or guardian. A minor who is married or earning his own living is considered an emancipated minor, and usually his signature is sufficient.
- c. Operations such as therapeutic abortion, sterilization, first Caesarean section, and amputation of limb usually require special consents and consultations. Check your hospital policy.
- d. If patient is unconscious and his family unavailable, obey hospital policy.

Note. A signature written as consent after the preliminary medication is given may be considered invalid, as the patient under narcosis is not responsible for his actions. Check your hospital rules for legality of consents.

5. Check time of administration and dosage of preliminary medication. This is important to the anaesthetist.
 6. Check recording of history and physical examination, including normal blood pressure. This is important for the surgeon, the anaesthetist and the nurses in the post-anaesthesia room.
 7. Check to see if reports on laboratory tests are present. The surgeon and anaesthetist will want to know if urine tests show albumin, acetone, or sugar. They will want to know the results of blood tests. If haemoglobin is below 10 grams, oxygen transport is lessened, as is reserve for potential surgical blood loss.
 8. Check for presence of wool blankets (explosive hazard) and remove. Check for dentures, jewellery, artificial parts, etc., and remove them for patient's safety; these must be signed for and taken care of per hospital policy.
- Note:* Today, the use of contact lenses is common. They are not easily seen and are hazardous to the unconscious patient.
9. Check for presence of eye makeup. This can cause irritation to the delicate eye structure should it enter the eye accidentally.
 10. Check preparation of operative area.
 - a. Must conform to surgeon's orders.

- b. Must be completed before patient enters specific operating theatre.

Awaiting Transfer to Specific Operating Theatre

Do not leave patient unattended.

1. The medicated patient is not responsible. (*Caution*: the patient who arrives quietly in the operating theatre may be the one who falls off the stretcher. Why? The noisy, restless patient will obviously not be left alone, but the quiet sleepy patient is apt to be. He may awake, forget he is on a stretcher, turn on his side, and fall to the floor.)
2. Intravenous treatments must be checked.
3. Presence of nurse lends reassurance to patient.
4. Untoward reactions may be noted and must be reported.

Minimize external stimuli.

1. Restrict conversation of staff.
Conversation concerning the patient increases his anxiety.
Conversation referring to other patients may be misinterpreted.
Conversation about personal matters reduces patient's security.
2. Eliminate unnecessary noise and activity.
Stimulates patient, thus reducing effect of pre-operative medication.
Tends to promote atmosphere of confusion in operating theatre.

Transfer to Specific Operating Theatre

Operating theatre must be in readiness.

1. Eliminates confusion.
2. Circulating nurse is free to care for patient.

Recheck of *chart* and *patient* is done by circulating nurse.

1. Name (compare name on chart and identification band with name of patient scheduled for that theatre).
2. Diagnosis (especially check *right* or *left* in cases of limbs, hernias,

kidneys, breast, etc. Do not rely on a prepared area to be the area of surgery).

3. Check name of surgeon in attendance (there may be more than one hernia operation going on in the operating theatre suite).

18 Positioning of Patient

There are specific positions in which the patient must be placed so that the desired surgery can be performed. Each type of operation has its individual demands, and so has each patient. The positioning procedures are patterned to best fulfil these requirements. Improper positioning necessitates the moving of the patient during procedures. This means time loss and the possibility of contamination.

There are *four* main points to consider when placing patients in position for surgery: *anatomy, comfort, safety* and *respiratory freedom*. The use of local or general anaesthesia does not alter these four main points. Many institutions have certain positions established for operative procedures. These will be referred to as “kidney position,” “chest position,” lithotomy position,” etc. When these established positions are used as intended by their originators, anatomy, comfort, safety and respiratory freedom of the patient have been taken care of.

Danger is present when these positions are not interpreted correctly, or when you devise the proper patient position yourself. To eliminate this danger, let these four points be your guide: When the patient has been placed in position, and you can say, “this patient is comfortable, necessary safety measures have been taken, respiratory freedom is established, and the anatomy for surgery has been considered,” then you have given good patient care.

Preparing the Theatre

Have all accessories (sand bags, pillows, foot boards, straps, etc.) for the desired position in readiness and conveniently located.

1. Time is conserved.
2. Prevents nurse from leaving patient and anaesthetist to get extra equipment.
3. Aseptic technique is maintained.

- a. Accessories hurriedly brought into the theatre may not be clean.
 - b. Accessories are placed a safe distance from sterile set-up.
4. Prevents confusion.
- a. Theatre is quiet, therefore emotional trauma to patient is not increased.
 - b. Handling of patient is minimized.
 - c. Task is done with assurance.

Have operating table properly located and *locked*.

1. Allow sufficient area about table for entrance of patient and transfer. (Prevents contamination.)
2. Locking table in place prevents injury to patient in transfer from stretcher or bed to theatre table.

Transferring Patient to Theatre Table

A nurse and two helpers must be in attendance when transferring a patient to the operating table. Place the stretcher next to the locked table. One person stands at the side of the stretcher, holding it closely against the table; the other person stands on the opposite side of the theatre table, ready to receive the patient. This prevents him from falling between the stretcher and table, and from falling off the far side of the table.

Proper regard must be given to patient's needs during transfer.

1. Fracture may need steady traction.
2. Guard against the accidental removal of tubes or catheters.
3. If patient is obese, guard against possible tipping of stretcher. Exert downward pressure on your side of stretcher as patient shifts weight to opposing side.
4. See that intravenous needles are not dislodged.
5. Always consider patient's comfort *and* security.

Placing Patient in Correct Position

Anatomy Involved

1. Know location of area to be treated. *For example:*
 - a. Location of organs or tumours.
 - b. Right or left extremity.
 - c. Area to be skin grafted, etc.
2. Know surgeon's approach and preferences.
 - a. There is more than one established position for many procedures.
 - b. Operative area must be easily accessible.

Comfort

1. Patient must be in a comfortable position whether conscious or unconscious.
 - a. Support head, body and extremities.

When patient is conscious, it is tiring for him to hold required position.

When patient is unconscious, beware of placing him in position which anatomically is not normal.
 - b. Prevent post-operative muscular discomfort or paralysis by guarding against
 - Arms extended and placed above shoulder level.
 - Incorrect practice of lifting one leg at a time for lithotomy position. (Same is true when returning patient to dorsal recumbent position.)
 - Inadequate support of hips in lithotomy position.
 - Legs crossed during anaesthesia period.
 - Portable instrument stand touching toes.
 - Feet hanging off table.
2. Do not expose patient unnecessarily.
 - a. Embarrassment is present for conscious patient.
 - b. Professional code respects an unconscious patient.
 - c. Heat loss is prevented.

Safety

1. Earth patient properly, prior to use of anaesthesia or electrical equipment needed for procedure.
2. Safeguard point of entry of intravenous needle.
 - a. Flow of necessary intravenous fluids must not be interrupted.
 - b. Avoid infiltration of fluids into soft tissue.
3. Protect body areas from injury. Some protections are:
 - a. Cover sand bags and rubber sheets with towels to prevent skin irritations.
 - b. Protect patient from pressure when using foot board, lateral supports, head brace, or perineal post. (Area or article may have to be padded).
4. Equipment for positioning must be clean to safeguard patient against infection.
5. Safeguard patient against falling.
 - a. Use table appliances or adhesive tape to insure safe maintenance of position.
6. Always be ready to place patient in shock position. *For example:*
 - a. When procedure is done in dorsal recumbent position, have patient's knees over break in table.
 - b. See that Hoyer mattress is correctly placed.
7. Restrain hands of conscious patients. (Explain to patient the reason for restraining hands, and then restrain them in a comfortable position.)
 - a. Prevents possibility of wound contamination.
 - b. Avoids unnecessary interruption of procedure.

Respiratory Freedom

1. Relieve chest area from external pressure. *For example:*
 - a. Prone positions. Support rib cage with soft rolls or use specially designed mattress that allows for unrestrained chest expansion.
 - b. Lithotomy positions. Obese patients or patients with respiratory

limitations must not suffer additional respiratory embarrassment from weight of arm restrained over chest area.

- c. Lateral positions. Elevate rib cage from operating theatre table with small resilient pad.
2. Aid in establishing adequate respiratory airway by position. *For example:*
- a. Head and neck surgery. Place soft roll under shoulders to prevent flexion of trachea.
 - b. When applying dressings or plaster casts to anaesthetized patients, hold head in extended position to maintain normal respiratory airway.

Transferring Patient to Post-Anaesthesia Stretcher

The same precautions and techniques are exercised as in transferring the patient to the theatre table. However, more assistance is needed as the patient is usually asleep and cannot help himself. Besides the necessity for personnel on either side of the table, one is needed on either end.

Transfer must be smooth.

1. Await anaesthetist's permission.
2. Lifting the patient and "bouncing" him onto stretcher can induce shock.
3. Surgical wound and repair must be considered.
4. Exercise care in transferring equipment (e.g., underwater seal bottles – temporary clamping of tubes may be desired).

Prevent injury to personnel.

1. Summon additional help.
2. Use proper body mechanics when lifting.
3. Use of special patient roller may be desired.

Consider other patient needs before leaving room. Provide warmth of a blanket, use of side rails or straps, small arm board for intravenous site. *Await anaesthetist's readiness before transfer.*

19 Towelling

The term “towelling” is used in theatres to describe the covering of tables, stands and patient (leaving only the area for surgery exposed). Sterile towels and sterile sheets of various sizes or specific designs are employed to provide an aseptic area for surgery. Skill and technique in handling these towels must be mastered to preserve the fundamental purpose of their use. To achieve successful aseptic towelling the nurse must plan her work.

Prepare the Theatre

Have only the necessary furniture in the theatre.

1. Provides more working area.
2. Reduces possibility of contamination.
3. Eliminates obstructions in carrying out procedure.

Inspect furniture for presence of dust, and remove by using a cloth moistened with disinfectant. This prevents airborne contamination via dust particles.

Inspect furniture for presence of moisture, and remove. This prevents transfer of bacteria through wet articles. (A sterile towel placed on a moist table becomes contaminated.)

Place furniture in area of use wherever possible.

1. This renders area convenient for work, thereby saving time and motion.
2. The moving of towelled objects increases chance of contamination.
3. Saves time at start of surgical procedure. (Set-up is organized and ready to go.)

Towelling Materials

It is very advantageous to spend a day or two folding the towels, packaging the linen supplies, preparing packs for the sterilization process, and then placing the sterile articles in the sterile supply closets. This familiarizes the nurse with what supplies are available, what articles are contained within certain packs, how certain sheets and towels are folded, and where supplies are located. The nurse also becomes aware of the amount of labour required, and will be more careful in handling linen, and less likely to waste supplies.

Know available towelling material.

1. Know size of sheets. (Seeing the area to be towelled or covered, you can visualize the size sheet or number of sheets you will need.)
2. Know the specifically designed towels available. (These were made to afford exposure of areas for particular operation.)
3. Know method of packaging towels (This increases your skill in handling the towels.)

Conform to institutional towelling policies. *For example:*

1. Required padding for sterile instrument tables and instrument stands. (Double thickness is necessary).
2. Required layers of sterile towels on patients for orthopaedic procedures, procedures involving extremities, etc.
3. Variations in techniques used for ear, nose, throat, and eye procedures.
4. Use waterproof or repellent paper.

Select towels designed to accomplish task or improvise intelligently. Prior to opening packages, estimate the number of tables, stand, etc. to be draped, and determine type of towel required by patient.

Principles of Towelling

Conform to *aseptic techniques:*

1. Protect your hands from contamination when towelling.
 - a. The towel must shield gloved hands at all times.

- b. When placing the towel, lift your hands and keep them *well above* the unsterile area. (If you keep hands down, you are likely to touch the unsterile area.)
2. Protect gown from contamination.
 - a. Do not reach across an unsterile area, as in passing a towel to a doctor on the other side of the uncovered patient.
 - b. Be constantly aware of unsterile areas, apparatus, people, etc. around you. *Remember*, your gown is loose-fitting, so that actually you need more room than normally to prevent contact with objects.
3. *Place* sterile towels, do not flip or toss them carelessly. You must have control of the towel, no matter how large.
 - a. Do not allow towels to drag on the floor.
 - b. Keep towel away from area below your waist and from sides of furniture. (By giving yourself room to unfold towel, and by keeping arms extended from body, you can avoid contamination of towel.)
 - c. Be sure you see all areas when you are towelling. (This seems so simple, and yet there have been many instances of contamination when a nurse has blindly wrapped a towel around a limb, or handled a large sterile sheet without being able to see over it.)
4. Placed sterile towels cannot be rearranged to achieve asepsis of an area. If the towel is not satisfactory, either have it removed, or add an extra towel to cover adequately the area. (By moving towels to different positions, you contaminate the area.) *For example:* Suppose you have covered a sterile table and you notice the towel does not adequately cover one end; the other end shows excess of towel. You cannot shift the towel. Below the table edge is considered unsafe, and you would be pulling a position of the towel that is of questionable sterility to an area where it must be sterile.
5. Some towels require two people to perform the task. Wait for assistance. This also refers to the placement of the available static-free plastic which is adhered to the prepared operative area and which takes the place of wound towels.
6. Discard damp towels and towels with holes. (Field is not con-

sidered sterile with either of these.)

7. Discard all towels questioned for their sterility.
8. Read date on package of towels, and do not use those beyond designated safe period.
9. Secure towels in desired position at time of placement. This avoids:
 - a. Shifting of towel during procedure.
 - b. Unnecessary recovering during procedure.
 - c. Contamination that may go unrecognized.

Arrange linen (or disposable towels) required to execute entire patient towel in order of use.

1. Forethought and planning save time and motion. You avoid omissions, prevent confusion, and conserve anaesthesia time.
2. Include odd items in arrangement, such as
 - a. Bandage to secure towel about hand or foot.
 - b. Required number of towel clips to secure towel.
 - c. Fluffs to protect perineum from antiseptic solutions when preparing adjacent areas.

Removal of towels post-operatively.

1. Remove towel clips or other devices that secure towel.
 - a. To prevent injury to the patient.
 - b. To prevent needless tearing of linen.
2. Shake linen prior to placing in hamper.
 - a. Prevents loss of instruments and gloves.
 - b. Prevents injury to laundry personnel.

The placing of the towels requires forethought and practice. Your speed and safety will be increased if you spend some spare time practicing the opening of towels, unfolding of sheets, placing the same in position, and planning supplies required by specific cases. When practicing, it is better to put on a gown and gloves so that you accustom yourself to the added precautions needed in a real situation.

20 Care of Specimens

Be careful with specimens removed from patients. The sister is entrusted with the handling, saving, labeling, and final disposition from the operating theatre of specimens that may be important for further diagnosis and treatment. Remember this responsibility and exercise care.

1. Have receptacle or towel ready to receive specimen.
2. Keep multiple specimens separate, and assure proper identification of each with correct label.
3. Exercise special care with small specimens. Air tends to dry tissue quickly, and this changes the gross appearance. Unless otherwise directed, moisten the specimen with saline immediately.
4. Package or prepare specimen for laboratory, according to standard rules in your hospital.
5. Prevent errors by labeling as to patient's name and hospital number, name of specimen, and surgeon's name, before specimen is placed with other specimens going to the laboratory. Write legibly.
6. Use method set up in operating theatre for recording of all specimens taken in the suite.

Cultures demand the same attention and care from the theatre nurse. They are taken to assist with the patient's diagnosis and treatment; hence, it is *not* to the patient's advantage if they are improperly prepared, allowed to remain for long periods of time at improper temperature, or lost, or if they are unlabelled or if the forms are illegible or incomplete.

1. Have proper applicators, culture tubes, media and laboratory forms available.
2. Label the individual tube or container with the patient's name and hospital number. (Prevents confusion in laboratory.)
3. Use the appropriate laboratory form and fill in all information requested. (This is then usually attached to the culture tube.)

4. Assure the safe and immediate delivery to the laboratory of the culture.
5. Use method set up in theatre for recording of all cultures taken in the suite.

21 Surgical Terminology

The nurse who is new to operating theatre techniques is rather suddenly exposed to surgical nomenclature. It is essential to understand the terms in order to interpret the operative schedule, understand the patient's diagnosis, follow directions and perform as an efficient member of the surgical team.

There are really no shortcuts for learning the vocabulary of any language. Constant attention to classroom instruction, frequent use of references, and study, are requisites for intelligent action.

There are methods of examining a word or words for the word root or common terms and then noting the prefix or suffix. For example, if you were told “-ectomy” meant “removal of”, would it not be reasonable to say that *appendectomy* meant *removal of the appendix*? Taking this knowledge, apply it to *tonsillectomy* (removal of the tonsil). *Cyst* means bladder or sac; thus, a *cystectomy* could mean the removal of the urinary bladder, or another type of sac, such as a *cyst* of the arm. The latter example illustrates the need for careful interpretation of the operative schedule and an awareness of the interchangeability of word elements.

Over the page is a brief list of terms which relate to surgical procedures.

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Prefixes, Suffixes, and Combining Forms

<i>Term</i>	<i>Meaning</i>	<i>Example</i>
a-, an-	not, without	<i>aseptic</i>
bi-	double, twice	<i>bilateral</i>
-cele	hernia, swelling	<i>rectocele</i>
-cide	destructive	<i>germicide</i>
cryo-	cold	<i>cryosurgery</i>
dis-	separation, negation or reversal	<i>disinfect</i>
-ectomy	surgical removal of or cutting out	<i>gastrectomy</i>
-aesthesia	sensation	<i>anaesthesia</i>
ex-	out of	<i>excise</i>
-gram	picture or tracing	<i>cystogram</i>
in-	in, into	<i>incision</i>
infect	to contaminate with a disease-producing organism	<i>infection</i>
-lith	stone, calculus	<i>cholelith</i>
lysis	destruction, a setting free	<i>lysis of adhesions</i>
-oma	tumour	<i>carcinoma</i>
-orrhaphy	a suturing	<i>herniorrhaphy</i>
-rrhaphy		
-oscopy	inspection, looking into	<i>cystoscopy</i>
-ostomy	to furnish with an opening or outlet	<i>gastrostomy</i>
-otomy	incision into	<i>gastrotomy</i>
pan-	entire, all	<i>panhysterectomy</i>
-pexy	fixation	<i>hysteropexy</i>
-plasty	reconstruction or repair	<i>rhinoplasty</i>
-scope	(an instrument for) seeing or observing	<i>cystoscope</i>
septic	pertaining to sepsis, infected	<i>septic cyst</i>
sterile	free from all living micro-organisms	<i>sterile supplies</i>
supra-	above, excess	<i>suprapubic</i>
-tome	a cutting instrument	<i>adenotome</i>
trauma	an injury or wound	<i>traumatize</i>

Practice is essential. Take time to review the operating list and interpret the surgical terminology logically.