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WAR DEPARTMENT TECHNICAL MANUAL

SURGICAL INSTRUMENTS

INDIRECT BLOOD

TRANSFUSION APPARATUS

AND MISCELLANEOUS SURGICAL SUPPLIES: CARE AND MAINTENANCE

WAR DEPARTMENT • 28 JANUARY 1944

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WAR DEPARTMENT,
WASHINGTON 25, D. C., 28 January 1944.

TM 8–611, Surgical Instruments, Indirect Blood Transfusion Apparatus, and Miscellaneous Surgical Supplies: Care and Maintenance, is published for the information and guidance of all concerned.

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BY ORDER OF THE SECRETARY OF WAR:

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Chief of Staff.

OFFICIAL:

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Section I

GENERAL

1. PURPOSE AND SCOPE. This manual is published for the information and guidance of all personnel charged with the care and maintenance of various surgical instruments, indirect blood transfusion apparatus, rubber goods, glass syringes, syringe needles, and surgical needles. Only care and maintenance are discussed, because repairs, except those of a minor nature, are not ordinarily attempted in the field.

2. DESCRIPTION.

a. Surgical instruments require constant care. They comprise one of the most important aids of the surgeon in the efficient performance of any operative procedure. Instruments are not mass produced but are the handiwork of highly skilled artisans. The supply of good instruments is limited, and the instruments themselves are costly. Maintenance and care must be exercised to prolong their life because their replacement is often difficult.

b. The importance of proper care of instruments, in their packing and shipping and their sterilization and cleaning, must be impressed upon those to whom responsibility for such procedures is entrusted, for most of the wear and deterioration of instruments occurs in the course of such procedures. Some instruments are more susceptible to damage than others, but, in principle, the following precautions are applicable to all instruments:

(1) In packing for shipment, sharp edges and delicate parts must be protected. The entire instrument must be protected from any corrosive action of air or water, and must also be carefully unpacked when received.

(2) During sterilization, measures must be taken to insure that parts are not damaged by striking each other or by striking the tray. Instruments that are adversely affected by heat sterilization must be cold sterilized. Cold sterilizing germicides that do not corrode or in any other way damage the instruments should be used. Distilled water, if available, should be used in heat sterilizers.

(3) After use, instruments must be promptly cleansed, to remove blood, lubrication jelly, and debris, and then disinfected by methods that will not damage them. After they are thoroughly dried, instruments must be suitably protected from corrosion before being stored.

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Section II

PRESERVATIVE MATERIALS AND GERMICIDES

3. PRESERVATIVE MATERIALS. Reference is made throughout this manual to various supplies needed for proper preservation and rust prevention. The complete nomenclature and sources of such supplies are as follows:

a. Oil. Oil, lubricating, preservative, special, Ordnance No. AXS777.

b. Compound. Compound, rust preventive, thin film, Ordnance No. AXS673 Rev. I.

4. GERMICIDES. Cold sterilization solutions for such items as cystoscopes, bougies, and catheters should be prepared with Item 1K39200, mercury oxycyanide.

Section III

SURGICAL INSTRUMENTS

5. GENERAL.

a. Surgical instruments are usually grouped into general or specialty instruments without regard to the character of care or maintenance each should receive. An attempt is made here to segregate the instruments into limited groups, such as the forceps group and the scissors group, the instruments in each of which groups require similar care and maintenance. However, it must be remembered that the care required in handling instruments is usually dependent on the delicacy or precision of their construction. A delicate cataract knife or a precision-made scope requires more careful handling than a heavy scalpel or a simple speculum.

b. By care is meant proper handling, whereas maintenance refers to lubrication or application of a protective compound for preservation purposes. Proper care and maintenance will materially lengthen the usable life of any instrument.

6. OPERATING KNIVES.

a. Operating knives are made from high quality tool or "cutlery" carbon steel or, in some instances, from stainless steel. Care is primarily concerned with maintaining sharpness as long as possible.

b. The surface of the blade of a carbon steel knife is not plated but given a bright polish. The cutting edge is carefully honed to a high

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degree of sharpness. Both the cutting edge and the surface of the blade are subject to oxidation (rusting) and must be protected to maintain sharpness. To prevent oxidation, the following precautions should be observed:

(1) When knives are not in use, they should be kept clean and free from moisture. To clean knives, wash them with soap and water; excessive rubbing and the use of abrasive cleaners should be avoided. . Immediately after cleaning they should be rinsed, wiped dry with either a clean, soft cloth or chamois skin, and then wiped with an oiled cloth. When knives are to be stored or shipped, they should be covered by a coating of protective compound. (See par. 3.)

(2) Rough handling, boiling, or the use of dry cotton or gauze for drying will damage the cutting edge. Knives must always be handled carefully.

(3) Knives should be cleaned and dried as quickly as possible after use, as contact with moisture is conducive to rapid oxidation.

(4) Stainless steel knives are not subject to oxidation, but should be given the same care as carbon steel knives because other corrosive agents may dull the blades.

7. FORCEPS.

a. Ring handled forceps. This group comprises various haemostatic, sponge, and grasping forceps, both chrome plated and stainless steel, and either box lock or screw lock. The vital parts of forceps are the catches, the lock, and the jaws.

(1) Forceps should be thoroughly cleaned with soap and water. A brush should be used to clean the catches and the crevices in the jaws. The branches should be spread, and the lock scrubbed. Abrasives, such as sharp cleansers, should be avoided as continued use of an abrasive cleaner might cut through the plating at the corners and permit oxidation. After cleansing with soap and water, instruments should be rinsed with plain water.

(2) Immediately after cleaning, forceps should be thoroughly dried, particularly the lock and catches. Then a drop of oil should be placed in the lock of a box-lock forceps or on the screw of a screw-lock forceps, and the catches and branches wiped with an oiled cloth.

(3) Haemostatic forceps should not be used for needle holders or sponge forceps because their use for such purposes will spring the shafts and prevent the jaws from approximating correctly.

b. Spring forceps. This group is composed of the dressing and tissue spring forceps. They are either chrome plated or stainless steel. Their care is similar to that of other forceps. However, care should be taken to see that the branches are thoroughly dried on the inside, particularly where the branches are attached, as otherwise the springs will rust

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through from the inside. After drying, spring forceps should be wiped with an oiled cloth.

8. SCISSORS. This group comprises various surgical and bandage scissors, both chrome plated and stainless steel. The vital parts are the cutting edges and the lock.

a. Scissor edges require the same care as knife edges. The edges of carbon-steel scissors are not plated and will oxidize readily.

b. Cleansing should be by soap and water only.

c. After cleansing and rinsing, scissors should be thoroughly dried and wiped with an oiled cloth.

d. Dissecting and suture scissors should be used solely for the purpose for which they were made; they are not intended for cutting cotton, gauze, bandages, paper, or similar materials. Do not use dissecting scissors to cut sutures. Do not open and close scissors unnecessarily.

e. Surgical scissors should not be boiled, but should be cold sterilized.

9. RONGEUR FORCEPS. Rongeur forceps (bone-cutting instruments) should receive the same care as other forceps. In operation, these forceps cut as a result of two cutting edges meeting, edge to edge, under pressure. This action in itself is injurious to the edges; therefore, these instruments must not be compressed indiscriminately. When stored they should be opened, with tension of springs released. Cutting edges require protection from oxidation.

10. RETRACTORS, CANULAS, CURETTES, AND MISCELLANEOUS INSTRUMENTS. The care of retractors, canulas, curettes, and miscellaneous instruments is basically the same as that for the groups of instruments already discussed. All such instruments should be thoroughly washed and cleaned as quickly after use as possible. They should be thoroughly dried, particularly any threads, grooves, and channels. Instruments made of tubing need particular care to insure that the inside of the tube is free of all debris before they are again sterilized; otherwise any debris present may be baked into the tube, with the result that the tube may be permanently closed or restricted. A good method of drying parts that are inaccessible is to put the instrument into boiling water, dry the parts that are accessible, and then blow out, with air from a compressor, those parts that are not accessible. After drying, always oil those parts that are moving parts, such as threads, catches, and slides.

11. PRECAUTIONS.

a. Particular attention must be given in the handling, sterilization, and shipment of all cutting instruments. Edges should always be protected from oxidation and contact with other instruments, to avoid dulling and nicking the edges.

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b. Certain instruments, such as cataract knives, are very fragile and are packed in individual cartons. This type of instrument requires special attention. They should be kept in their individual cartons at all times, except when in use. They require most careful sterilizing and cleaning if damage to the delicate edges is to be avoided.

c. The design of certain instruments is such that they can be readily disassembled. Tools are usually not required, and force is not necessary. If more than one instrument of the same manufacture is taken apart for cleaning at the same time, parts from one instrument should not be interchanged with the other. Instruments are individually assembled and fitted. Most manufacturers number all parts of the same instrument with the same number, and instrument parts can therefore be readily sorted.

12. CYSTOSCOPES. Cystoscopes are complex and delicate instruments. They are subjected to conditions that are ordinarily injurious, and their continuous service can be obtained only by giving particular attention to their care. Satisfactory use of this instrument depends on proper functioning of the lighting system and a clear view through the lens system.

a. Lighting system. If a cystoscope fails to light properly, inspect all points where an interruption of the circuit can occur. These instruments must be watertight to function properly; therefore, when a lamp is inspected or replaced, care must be taken to see that this junction is sealed properly. Short or open circuits, which invariably involve extensive repairs, are in practically every instance the result of moisture leaking into the electrical system. A short circuit within the instrument usually causes it to become quite warm and will rapidly exhaust the battery. An open circuit causes a total interruption of the circuit, preventing any current from reaching the lamp.

(1) To remove the lamp, first remove the cap at the distal end of the instrument by means of the large rubber tip that is furnished for this purpose. The tip is placed over the cap to permit the fingers to grasp the cap securely. Do not use forceps to remove the cap as excessive pressure will damage it. The lamp should then be removed; it usually can be shaken out of the tubular contact in which it rests, although if corroded it may be necessary to insert a knife blade between the contact and the flange of the base of the lamp. Do not use forceps to remove the lamp, as excessive force may dislodge or damage the contact. The lamp can be tested by grasping it lightly on the metal collar with a tissue forceps and placing the base contact of the lamp on one terminal of the battery box and then touching the other terminal of the battery box with the branches of the forceps. In making this test, the control on the battery box should be so set that the current will not burn out the lamp filament.

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(2) Before replacing the lamp or inserting a new lamp, inspect the spring contact within the cap; it should be free and clean. The tubular contact in the sheath should also be clean. These contact surfaces may be cleaned by lightly scraping them with a sharp instrument, although care must be exercised, particularly in the instance of the tubular contact, which is extremely delicate.

(3) Insert the lamp and apply to the threads a small amount of the special grease supplied with each instrument, being careful to keep the grease from reaching the contact surfaces of the sheath or lamp. Replace the cap, tightening it lightly with the rubber tip. The use of the special grease seals the lamp chamber against the admission of moisture and prevents resultant corrosion. Once a lamp is installed in the manner described, it should not be disturbed until its replacement is necessary.

(4) If the sheath or telescope is equipped with a lamp of the threaded-base type, the same procedure applies; however, only one contact, at the base of the lamp socket, is involved. As the circuit is completed when the small spiral wire at the center of the base of the lamp touches the contact, the surface must be clean. This contact surface can readily be cleaned by lightly scraping it with a sharp instrument; a minimum amount of metal should be removed. Before installing the lamp, lift up the small spiral wire at the center of the base of the lamp with the point of a pin and apply the special grease to the threads of the lamp only.

(5) If the instrument still fails to light, inspect the rotating contact surfaces where the wires from the battery box connect to the insrument. These surfaces should be clean, and the contact positive on both rings. In the routine care of the instrument, occasionally remove the rotary contact and polish the matching surfaces of both the contact and contact rings. If this care is neglected, the surfaces will corrode or accumulate a film of nonconductive material; either circumstance will interrupt the flow of current and cause flickering of the lamp.

(6) The contacts in the connector that connects the cord to the contacter should be inspected to make sure that they are clean.

(7) If batteries are exhausted, they should be replaced.

(8) The cord should be inspected for breaks; if any are present, the cord should be replaced with another cord.

(9) If the instrument fails to light after all the foregoing steps have been taken, the trouble is probably within the body of the instrument, and it should be returned to the depot.

(10) The lens system should be examined for clarity by looking through the scope toward a source of daylight. If the field of vision is indistinct, the lens at the eye piece and the lens at the opposite end should be polished. A toothpick may be used to remove dried deposits of lubricating jelly or

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similar deposits; such procedure will not injure the lens. The toothpick may be moistened slightly with water, if necessary, but not with alcohol.

b. Sterilization.

(1) Dents or surface abrasions are usually the result of careless handling, particularly during sterilization. The instrument should never be dropped or slid into the sterilizing tray. A folded towel in the bottom of the tray will prevent damage to the instrument. Similar procedure should be followed with respect to sinks, metal tables, or any surface on which the instrument is placed or stored.

(2) A proper sterilizing solution should be used for cold sterilization; alcohol or carbolic acid should not be used for such purposes. Do not boil any part of a cystoscope.

(3) After use, clean the instrument with soap and water to remove oil, lubricating jelly, and blood. Then disassemble it, rinse in tepid water, and wash all parts thoroughly with cotton dipped in tincture of green soap. The interior of the sheaths should be swabbed with green soap, the cleaning rod being tipped with cotton. Surfaces not readily accessible can be cleansed with a *soft* brush and soap, the bristles of the brush being moved with a scrubbing motion over the surfaces. Do not use abrasive cleansers. The disassembled parts of the instrument should then be thoroughly rinsed with tepid water and dried.

c. Assembly. Care should be taken to prevent parts belonging to one instrument from being assembled with those of another similar instrument. If an interchange of parts occurs, force should never be used to assemble the parts.

13. BRONCHOSCOPIC INSTRUMENTS.

a. Care of bronchoscopic and accessory operating instruments is the same as that of instruments already discussed. They can be sterilized by boiling or autoclaving and should be cleansed with soap and water. A long-handled brush should be used to clean the inside of scopes, and a worsted, rodlike cleaning material for cleaning the inside of light carriers and aspirating tubes. Brass instruments do not need a protective film of oil, but the steel accessory instruments should be oiled to prevent corrosion.

b. Light carriers, lamps, and cords should not be boiled; they should be sterilized with alcohol.

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Section IV

INDIRECT BLOOD TRANSFUSION APPARATUS

14. GENERAL. Indirect blood transfusion apparatus is of two types. One permits the transfusion of fresh whole blood by an open technique, the other permits the transfusion of stored whole blood by a closed system. Both are equally useful in different situations, but both require the same careful preparation and maintenance.

15. TRANSFUSION APPARATUS FOR FRESH WHOLE BLOOD.

a. In order to make use of equipment readily available in all medical installations, it is considered feasible to employ the expended standard Army and Navy package of plasma for fresh whole blood transfusions in all installations in the theaters of operations. After the dried plasma is reconstituted, the empty distilled water bottle provides a closed receptacle that is sterile and free from foreign material. The intravenous and airway assemblies may be salvaged by immediate cleansing and may be employed for blood transfusion.

(1) Immediately after the distilled water is emptied out of the distilled water bottle of the plasma set, the double-ended needle should be removed from the stopper of the water bottle. The stopper must remain in place to assure the sterility of the bottle.

(2) The airway assembly must be washed out well with two rinses of tap water and one of sterile sodium chloride, physiological solution, Item 14295.

(3) The filter in the intravenous set should be removed and replaced with the stainless steel filter in a glass housing, Item 36099.

(4) The intravenous set must be flushed out with two rinses of tap water and one of sterile sodium chloride, physiological solution, Item 14295.

(5) The bleeding set, consisting of a 15-gauge needle attached to an 18-inch length of rubber tubing, must be thoroughly flushed out with two rinses of tap water and one of sterile sodium chloride, physiological solution, Item 14295, wrapped in cloth, and autoclaved within 2 hours after assembling.

(6) The intravenous set and airway assembly must be wrapped in cloth and autoclaved at 250° F. for 30 minutes within 2 hours after being assembled. If the bleeding set, intravenous set, and airway assembly are not used within 10 days after preparation, they should be rewashed and sterilized before use.

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b. The bleeding bottle is prepared for use by transferring 50 cubic centimeters of 4 percent sterile solution, sodium citrate with 8–10 cubic centimeters of glass beads 5–6 mm in diameter, Item 14306, to the transfusion bottle (distilled water bottle).

c. The transfusion apparatus for fresh whole blood by an open technique is expendable except for the stainless steel filter in a glass housing, Item 36099, and should not be reused for transfusion therapy. The filter and glass housing are not expendable and should be handled as described in paragraph 16.

16. TRANSFUSION APPARATUS FOR STORED WHOLE BLOOD.

a. In order to maintain the sterility of blood during storage, it is essential that it be collected under a closed system and stored in a closed container. The collection of stored blood will be confined to general hospitals.

b. The transfusion apparatus for stored whole blood consists of a donor set, complete, Item 36093; recipient set, complete, Item 36097; needle, Luer 17–19 gauge; and an expendable vacuum bottle.

(1) Immediately after use, disassemble the donor set and thoroughly flush all parts with cold, running tap water. The donor and valve needles must be thoroughly cleaned. This may be accomplished by inserting stylet or cleaning wire through the needle to make sure the canula is open and free of residue. If blood has been allowed to clot in the needles, they should be soaked in hydrogen peroxide, solution USP, Item 12290, for a short time before carrying out this step. The translucent rubber tubing should be thoroughly washed with sterile sodium chloride, physiological solution, Item 14295, and inspected against a bright light for evidence of clotted blood. If clots are noted they should be removed by rolling the tube between the palms of the hands and then flushing with sterile sodium chloride, physiological solution. Cut off about ½ inch of each end of the rubber tubing. The ends of the tubing in contact with metal lose their elasticity due to the excessive heat during autoclaving. Cutting off the ends of the tubing following use assures a tight, leakproof fitting. Before assembling the donor set, the core of the detachable valve screw should be inverted and two or three drops of undiluted glycerin USP, Item 12180, allowed to drop on the point of the core. While in the inverted position, the screwhead should be seated in the body of the valve and then loosened one-half turn. The valve must not be tightly seated during autoclaving or it will be damaged. The donor set should be wrapped in muslin and autoclaved. If not used within 10 days after preparation, it should be rewashed and sterilized before use.

(2) Immediately after use, the recipient set should be disassembled and the parts washed thoroughly in a solution of tincture of green soap, followed by a rinse with freshly distilled water. The stainless steel mesh

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cylinder should be placed, open end up, in a glass stoppered bottle containing concentrated nitric acid and allowed to soak at room temperature for 24 hours. Remove the mesh cylinder from the nitric acid with forceps and rinse it thoroughly with several portions of freshly distilled water. Clean the rubber tubing and needles as already described. Reassemble the set, being careful that the metal cap is screwed tightly into position. Wrap the assembled set in muslin and autoclave. If not used within 10 days after preparation, it should be rewashed and sterilized before use.

(3) The needle, Luer 17–19 gauge, should be cleaned as described in paragraph 19a.

(4) New rubber or tubing that has not been cleaned within 2 hours after use should be boiled in sodium carbonate, anhydrous ACS, Item 14260, for 15 minutes, rinsed thoroughly with tap water, and then prepared in the usual way.

Section V

MISCELLANEOUS SURGICAL SUPPLIES

17. RUBBER GOODS.

a. Rubber goods comprise gloves, bougies, catheters, tubing, and sundries. There are three principal factors in the deterioration of rubber goods: dilution, oxidation, and normal wear.

b. Oils, fats, and greases, both mineral and vegetable with the exception of castor oil, cause dilution of rubber goods. The rubber absorbs these materials with the result that the rubber swells and becomes tacky.

c. Excessive heat, light, and strong chemicals cause oxidation of rubber.

d. Normal wear is not an important factor as it is usually preceded by dilution or oxidation of the rubber.

e. Before sterilizing, rubber items should be thoroughly cleaned with soap and water. They should not be placed in contact with metal surfaces of the autoclave. Copper or alloys that contain copper are very injurious to rubber. Gloves must be thoroughly dry and powdered with talc before autoclaving.

f. Steam pressure in the autoclave should not be permitted to rise above 15 pounds or 250° F.; the oxidation factor approximately doubles for each rise of 18° F. The length of time that rubber items are kept in the autoclave is also a factor in the oxidation process, and this time should be limited to 20 minutes or to the minimum period necessary for proper sterilization of the items. After sterilization, the articles should be kept in a dry sterile container until used; wrapping the articles in sterile cloth is an acceptable procedure.

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18. GLASS SYRINGES.

a. Proper care of glass syringes will materially increase their useful life. Immediately after use, the plunger and barrel should be separated and rinsed with cold tap water. This procedure will materially reduce the number of stained, jammed, and broken syringes, and is particularly necessary in the instance of a syringe that has been used for blood work. If it is impossible to rinse the parts of the syringe immediately, they should, at least, be separated and placed in a container of water. The separate parts should be washed and scrubbed thoroughly with warm water and green soap. Use a good grade of fiber scrub brush for outside surfaces and a regular bottle brush for the inside of the barrel. Rinse the parts in three changes of water, taking particular care to remove soap particles from ground surfaces and graduation marks. Use a brush with the first rinsing. For blood work, the third rinse, at least, should be in distilled water. Finally, rinse the parts in either alcohol or ether and allow them to dry thoroughly. If, however, the parts are to be sterilized immediately, rinsing them in alcohol or ether is not necessary.

b. If syringes are rinsed immediately after use, there is little danger that they will become stained. When staining does occur, the stains can usually be removed by swabbing the affected parts in dilute acid solutions; however, such acid solutions should not be permitted to come in contact with metal parts. In all instances, swab the affected parts carefully with a cotton applicator dipped in the cleaning solution, and rinse the parts thoroughly after each swabbing. The usual stains and the solutions recommended to remove each are as follows:

(1) Alkali deposits—a 10-percent solution of nitric acid.

(2) Arsenic and iron stains—a 10-percent solution of hydrochloric acid.

(3) Gentian violet stains—a 10-percent solution of nitric acid.

(4) Blood stains—a 10-percent solution of nitric acid, or a solution of sodium citrate, or concentrated ammonia.

(5) Gummy oil deposits—benzine, followed by scrubbing.

c. Extreme care must be taken when an acid solution is being used on a syringe with metal parts. Do not permit the solution to come in contact with any such part, not even the lumen of the metal tip. Also, never leave a glass syringe immersed in strong acid or alkali solutions. Syringes with metal parts should never be left immersed in solutions that contain mercury or any of its derivatives.

d. Syringes are readily broken in the course of sterilization. If the following precautions are taken, however, such breakage will be kept at a minimum:

(1) After thoroughly washing and cleaning the syringe parts, match the serial numbers on barrels and plungers. Syringes are individually fitted and, therefore, the parts are not interchangeable.

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(2) Wrap the barrel and plunger of the syringe separately between layers of gauze, then wrap them again, together, in a double layer of muslin, and pin or tie the muslin.

(3) Label the muslin wrapping with a soft lead pencil.

(4) Sterilize the wrapped syringe barrel and plunger for 20 minutes under 15 to 20 pounds pressure at 240° F., unless specific instructions to the contrary are provided for a particular autoclave. Efficient sterilization by boiling is predicated on thorough cleaning and preparation of the syringe. Some authorities contend that, even when every precaution is taken, only a small margin of safety exists if resistant spores are present. Autoclaving is generally accepted as the best practical method of sterilizing hypodermic syringes.

e. Boiling in hard water wears down the ground surfaces of the glass and deposits alkali, causing syringes to leak and jam. Do not boil syringes in water to which sodium bicarbonate or sterilizing tablets containing this chemical have been added, as this chemical compound is an alkali. Any water will eventually erode glass, but distilled water is considered the best medium to use. Place the syringe parts in the sterilizer with the barrels on top of the plungers. This procedure will prevent the tip from coming in contact with the sterilizer pan, thereby eliminating the possibility of chipping the tip. Boil for 20 minutes; unnecessary boiling shortens the life of a syringe. Make certain that the syringe is completely covered by the water.

f. Moist heat, as available in autoclaving, is necessary to kill germs rapidly. If time is not a factor, dry heat is sometimes employed. If syringes are sterilized in a hot-air sterilizer, the instructions supplied by the manufacturer should be followed. The temperature usually employed ranges from 340° to 360° F., and the period involved is at least 1 hour.

19. SYRINGE NEEDLES.

a. In the cleaning of needles, maintenance of the sharpness of points and open canula are important. The needle should be flushed with cold water immediately after use and removed from the syringe tip. Wash the needle thoroughly in a basin of water and green soap; insert stylet or cleaning wire through the needle to make sure the canula is open and free of residue. Insert wire through the hub end; inserting the stylet or wire from the point may injure or dull the cutting edge. Clean inside of hub with a tightly wound cotton applicator. Remove stains; Bon Ami or similar preparations may be used. Dried blood may be removed by rinsing the needle with carbon bisulphide, benzol, xylene, or carbon tetrachloride. Rinse with alcohol or ether. For a complete, quick drying out, compressed air may be used; this procedure assures a clean hub and needle canula.

b. If needles are sterilized in an autoclave, the points should be given particular care. Place cotton in bottom of a test tube and drop in needle,

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point down; or use a special tube with a constricted neck to suspend the needle in the tube. Cover the mouth of the test tube with a square of muslin, and secure the muslin with thread or a rubber band. With a soft lead pencil, label the muslin with the size of the needle. Sterilize for 20 minutes under 15 to 20 pounds pressure at 240° F., unless specific instructions to the contrary are supplied for the sterilizer.

c. If sterilization is by boiling, place the needle carefully in the sterilizer so that the point will not be damaged by forceful contact with the metal pan. This can be accomplished by grasping the flat of the hub of the needle with forceps and gently placing the needle in the pan, with the hub contacting the pan first. Needles should always be placed, not dropped, in the pan, and should be completely submerged.

20. SURGICAL NEEDLES.

Surgical needles are preferably sterilized in hot-air sterilizers. For high-pressure steam sterilizers, they should be sewn into gauze and wrapped in muslin. After use, needles should be carefully washed with soap and water, rinsed and dried, and then wiped with an oiled cloth. When cleaning needles, be sure to keep the eyes free from debris by forcing a fine wire through the opening.

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