ER4

IN CONFIDENCE

AGAA/P(71)28

ADVISORY GROUP ON TESTING FOR THE PRESENCE OF AUSTRALIA (HEPATITIS-ASSOCIATED) ANTIGEN AND ITS ANTIBODY

Comments on the report of the group on which the Department would welcome further advice.

1. The Department has consulted a number of interested bodies and organisations on the Report, and would welcome the further advice of the Advisory Group on resulting comments which are summarised below.

The following comments have been made on which advice is requested:-

LOCAL DONOR PANELS

2. "It must be realised that many hospitals organise their own panels of blood donors - some quite extensively. The haematologists in charge of such donor panels will have to face the problems confronting the NBTS in safeguarding recipients from transfusion hepatitis. How can they do this while still complying with the recommendations in paras 13, 27 and summary (V), that it is undesirable to perform tests in hospital pathological laboratories except where there is a consultant virologist on the staff?" (ACP)

METHODS OF TESTING

Page 5, Para 17

3. "The last sentence is not always and necessarily correct since in some circumstances the CF test may actually be less expensive in terms of Anti-HAA. For instance, at the moment the high titred antiserum in use is prepared in guinea pigs and obtained from the National Institutes of Health in America. In CF tests it titres 512 and is used at 8 times titre, ie 1/64. The serum may be 16/32 times more sensitive by CF than IEOP for detection of HAA although less of it is used for the CF test. In order to avoid prozone difficulties sera are tested at 2 dilutions. It is suspected that the commonly held view expressed by the Committee may be true in terms of the average low titred reagents: this point also comes up on page 6 towards the end of paragraph 18". (ACP)

READING OF RESULTS

Page 7, Para 24

4. "There appears to be some ambiguity in the sentence reading 'The results were read in succession by each of two persons, one of whom was professionally or technically qualified'". (IMLT)

RECEIPT OF SPECIMENS

Chapter 6

5. "We accept the recommendations regarding the packaging and transmission of high risk samples and consider that the same principles should be extended to cover all other samples coming into the Transfusion Centre. This recommendation would nullify most of those in paragraph 39 which in any case are unrealistic". (4RTDs)

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Scissors, forceps, needles, needle holders (Sterilization)

Use:

1. CSSD or local hospital service;
2. Hot air sterilization in oven; or
3. Steam sterilization in pressure cooker or autoclave.

Skin (Disinfection)

Use isopropyl alcohol, 70 per cent.

Syringes (Sterilization)

Where possible use pre-sterilized disposable syringes.

For special syringes, for purposes for which disposables are unsuitable, or if disposable syringes are not available, use:

1. CSSD or local hospital service; or
2. For sterilization in the surgery:
   (a) Discard into disinfectant/detergent mixture as for diagnostic instruments.
   (b) Dismantle and wash in the same mixture.
   (c) Rinse in hot water.
   (d) Dry in rack. Reassemble.
   (e) Sterilize in hot air in oven (not in autoclave – this may be ineffective).

Thermometers (Disinfection)

(a) After use wipe clean on dry tissue or, if visibly soiled, rinse or wash under the cold tap.
(b) Dip in isopropyl alcohol 70 per cent (prepared freshly each day in a clean container disinfected by heat).
(c) Shake dry and use again or store dry in covered container.

Rectal

Use disposable sleeve to prevent soiling. Treat as above.

Thread for stitching (Sterilization)

Use:

1. Catgut, pre-sterilized, disposable;
2. Silk or nylon, sterilized by CSSD or local hospital service; or alternatively in surgery by pressure cooker or autoclave (not in oven owing to risk of damaging thread).

Towels, linen and blankets

Use:

1. Disposables and discard after use; or
2. Launder towels and linen daily in a washing machine arranged to disinfect by providing a temperature of at least 65°C for 10 minutes. Blankets of cellular cotton do not suffer from frequent laundering at this temperature. Weekly laundering of blankets is a reasonable recommendation unless they are visibly soiled.

Westergren tubes and other equipment soiled with blood

In view of the known hazard of acquiring hepatitis from blood extreme care should be used in washing any apparatus so soiled. Ideally, gloves should be worn and some protection provided for the eyes.

(a) After use, run blood out into a bowl containing extra-strong hypochlorite solution (10 000 ppm available chlorine). Allow the mixture to stand for at least 30 minutes before discarding.
(b) Put tubes into a jar containing the extra-strong hypochlorite solution with a detergent at 1·0 per cent. Leave overnight.
(c) Next day wash in hot water and the same detergent; rinse first in tap water, then in distilled water, and dry in oven.

Plan of work in surgery

The following plan of work is offered as an outline only. Details should be filled in according to the needs of and the facilities available in the practice:

I. Work done immediately after a surgery session

1. Removal of disposables:
   (a) All disposables may be sent to the local hospital for destruction, by special arrangement.
   (b) Dressings, dishes, cloths, sheets and towels may be burned in domestic incinerator or boiler.

   Syringes may be burned in a domestic incinerator if sufficient other materials are present to produce plenty of heat; or they may be broken up and flushed into the sewer by a domestic refuse destructor.
2. Removal and return of soiled instruments, in plastic bags, to CSSD or hospital.
3. Washing and pasteurizing of diagnostic instruments and brushes used to clean them.
4. Washing of thermometers and dishes.
5. Washing and pasteurizing of floor mops and dusters, if not disposable.
6. Washing of work surfaces with warm water and detergent.
7. Tubes used for blood remain overnight in disinfectant/detergent mixture.

II. Work done the following morning before next surgery session

1. Washing of tubes used for blood which have been disinfected overnight.
2. Pasteurizing of dishes.
3. Disinfection of work surfaces, using disposable cloth and
   (a) Isopropyl alcohol;
   (b) Industrial methylated spirit; or
   (c) Hypochlorite solution giving 200 ppm available chlorine.
4. Preparation for sterilization which is done at the surgery during surgery hours.

NB: Instruments which have been sterilized by heat must be stored dry, either in their wrappings or, if unwrapped, in a covered container. Wrapped instruments may conveniently be stored in cardboard boxes or in tins which need not be airtight but which offer some protection against accidental wetting or breakage of the wrapping. As long as the wrapping remains dry and unbroken the instrument will remain sterile. The storage of heat-sterilized instruments in disinfectant solutions is unsafe.

We acknowledge, with gratitude, the help and advice given by Dr P M Higgins in the preparation of this article, and also that of a number of general practitioners who took the trouble to read the article in draft and send us their comments.

References

Grahame, R, 1965. *Lancet*, i, 1109.

Kelsey, J C, 1970. *British Hospital Journal and Social Service Review*, **80**, 521.

Public Health Laboratory Service, Committee on the Testing and Evaluation of Disinfectants, 1965. *British Medical Journal*, i, 408.

FIT TO DRIVE? (a correction)

In the article published in the May 1971 issue of *Health Trends*, under **Epilepsy** on p. 22 the rule quoted under (b) was replaced by a clearer one in the Regulations issued in April (Motor Vehicles (Driving Licences) Regulations, 1971). The sentence should read: '(b) in the case of an applicant who has had such attacks while asleep during that period he shall have been subject to such attacks *whilst asleep but not whilst awake* since before the beginning of that period;'.

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SAFETY IN LABORATORIES

Chapter 6, Page 12

6. "Regarding the section on safety in laboratories (Para 36-45), it is difficult to fault the recommendations on theoretical grounds, but it is equally difficult to accept the practical feasibility of many of the proposals. High risk specimens should be clearly labelled and packed in leak-proof containers. They can be segregated for handling by specially trained staff wearing protective clothing. However, it is unrealistic to expect every laboratory clerk and technician handling routine specimens to be able to work in apron and gloves. Furthermore, it appears that every time a blood stained form is photocopied, the photocopying machine would have to be sterilised". (ACP)

SMOKING, ETC

7. "There is general agreement that warning notices and regulations banning smoking and eating or drinking in laboratories are required, but many laboratories are inadequately equipped with proper rest and recreational rooms for laboratory staff". (ACP)

CENTRIFUGES

8. "Centrifuges need special attention and the Association urges the Department of Health to pursue the study of design features with manufacturers. It may be unrealistic to advocate air extraction hoods above centrifuges as many in use scattered throughout complex laboratory buildings are employed for spinning potentially dangerous samples at one time or another". (ACP)

9. "Comments on centrifuges in paragraph 42 express complete lack of understanding of centrifuge design. We consider that this matter should be taken up by Supplies Division urgently with the manufacturers. There appears to be a greater risk from the use of Pasteur pipettes". (4 RTDs)

10. "I take it that this comment on centrifuges extends to the whole laboratory area. If this is so, it will involve a good deal of expenditure and some laboratory reorganisation". (an RTD).

DEGREE OF RISK IN GENERAL

See para 60

11. "At present it is felt that there is no evidence outside renal dialysis and associated units of any excessive risk to laboratory staff and, in this sense, many of the precautions recommended may appear to be exaggerated. The staff at greatest risk are those working near to the donor or patient: in these circumstances venepuncture assistants, donor attendants, doctors and nurses run the greatest risk of accidental contamination of their hands with blood. They also more frequently puncture their fingers with needles contaminated with blood of patients or donors. It seems unwise to label the laboratory as the high risk department as this could have adverse effects on the future recruitment of ancillary and clerical staff". (ACP)

? para 36 line (3)

HIGH RISK SPECIMENS

Page 13, Para 40

12. Should not para 40 be reworded to cover patients treated at home or by their gps also? ✓

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DISINFECTION

13. Should not concentrations of disinfectant be revised in accordance with Kelsey and Maurer, 1971, at Annex A?

REAGENTS

Page 16, Para 49

14. "It has been reported that heating serum containing antigen at 60°C for 16 hours or at 85°C for 1 hour leaves its CF reactivity unimpaired, although the material is unusable in IEOP". (see Ross CAC, Pringle RC and Michael S, J Clin Path 1971, 24, 475) (ACP) .

POSITIVE DONORS

Page 19, Para 57

15. "The decision on whether or not to remove a donor's name from the panel should not necessarily be dependent on the result of tests of a repeat sample". (Four RTDs)

LETTER TO DONORS

Page 19 Para 57 and Appendix 3

16. "This is a mildly hair raising procedure from the point of view of the donor. I feel the letter to the donor could be rather more reassuring than it is and I can imagine some donors fearing that they are at death's door when they get that letter. The paragraph and letter to the GP admits that the significance of a positive test is unclear. In my experience if one tells donors that they have a peculiarity of unknown, but quite possibly of no, significance to their health, they will fall over backwards to help if you tell them they have valuable opportunity to help us understand the peculiarity in question". (an RTD)

17. "I have only one small reservation about the draft letter to be sent to the patient who has been discovered to have a positive test. I have tried to imagine what effect the receipt of such a letter would have on a nervous patient and I wonder whether an extra phrase might be put into the penultimate paragraph to afford some sort of reassurance. Our local Blood Transfusion Service has a letter to cover the circumstances in which they suggest that it is unlikely that the patient has anything to worry about, but that it would be better if they did consult their own doctor ..... I enclose a copy of such a letter which Dr Sheilagh Murray, the Director, has given me permission to let you see". - Annex B (JCC).

LETTER TO DOCTORS

Page 19, Para 57 and Appendix 4

18. "When a positive donor has been found the RTDs responsibility should end when his name has been removed from the donor panel andhis doctor informed. It is not part of RTDs' obligations to influence the family doctor's choice of consultatant nor to be involved in a further follow up". (4 RTDs)

19. "The third paragraph in the suggested letter refers to the desirability of having LFTs done and mentions sending a blood sample to the pathology laboratory ... I think that it would be better if the first two sentences of this paragraph were replaced by "May I suggest that it would be desirable to have liver function tests done as he/she may possibly be incubating the disease and that you should consult the pathologist at your local hospital about these tests". (ACP)

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TESTING OF STAFF

Page 21, Para 61

20. "There would seem to be similar reasons for the testing of Public Health Laboratory Service staff who are engaged in the testing recommended, as the report suggests for the staff of Regional Transfusion Centres, and it might be thought that the same recommendation should be applied to them". (RC Path)

21. "Referring to recommendation iii on page 22 it is felt that the term "direct contact" should be more precisely defined so as not to exclude those found to be positive from handling closed specimens; eg as van drivers or porters". (RC path)

22. One Regional Transfusion Director points out that it may be hard to redeploy donor attendant staff found to be positive to other duties, especially since they may suffer loss of income as a result of redeployment. He feels this recommendation may well cause hardship.

LIST OF EQUIPMENT

Appendix 1, Page 24

23. "The list of equipment should include one levelling table for use in preparing gels, and also for use during separation of sera. The use of some kind of automatic pipette with disposable blunt ends is recommended." (ACP)

CODE OF PRACTICE FOR LABORATORIES

Appendix 2, Page 27, Para 7

24. "Paragraph 7 of this section suggest that cross matching of "high risk" patients should be done in the HAA Laboratory. Para 40 of the main report defines "high risk" patients and includes leukaemia under heading 3. Patients with leukaemia or reticulosis might constitute a regular source of work for the cross-matching section. Under para 5 of the code of practice staff working in the HAA laboratory should be debarred from working elsewhere in the laboratory. This presumably applies to the cross match section.

"Cross matching requires an experienced technician and great concentration. I do not think it is a function the senior in charge of HAA screening could be expected to cover. In any case he may not be skilled in serology of this sort. In other words we may be required to have extra staff standing by in isolation to cope with this sort of cross match problem or else to be prepared to put someone into purdah for a day when such a problem crops up".

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Annex A

Asepsis and the General Practitioner

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This article is a response to requests for advice which suggest that doctors are not always given adequate information about sterilization and disinfection during their training. In spite of all that has been written on these subjects in recent years, many are not clear about the difference between the two and are optimistically 'sterilizing' sharp instruments in chemical disinfectants. This mistake is certainly not confined to general practice.

Sterilization is the complete destruction of all micro-organisms, including bacterial spores such as those causing tetanus, gas gangrene and anthrax. Sterility is desirable for any item which may come into contact with an open wound. Disinfection is the removal or destruction of non-spore-forming bacteria. Disinfection cannot be depended upon to destroy bacterial spores but is normally adequate for diagnostic instruments which do not penetrate skin or mucous membranes.

Heat is the most effective sterilizing and disinfecting agent. Very few chemicals will sterilize and those which do, such as ethylene oxide, are quite unsuitable for use in general practice, although they are used successfully by manufacturers of pre-sterilized disposables. A number of chemical disinfectants are available, but heat is more reliable and usually cheaper than a chemical method. No chemical should be used as a 'steriliser' although some commercial literature uses this word in describing disinfectants.

We give below an outline of the general principles behind good aseptic practice, together with some recommendations which may serve as a guideline on this thorny path. Several general practitioners have been good enough to read and offer comments on our recommendations but their comments have tended to cancel each other out, showing that practices and conditions vary so much that recommendations must offer a wide choice if they are to be of help. Nevertheless, we believe that most GPs will be able to find among the methods and products listed at least one for each purpose which is suited to their own circumstances.

Sterilization

When sterility is essential:

1. Pre-sterilized disposables, to be used once and discarded, are the first choice. There must be no attempt to re-sterilize and re-use pre-sterilized disposables. Disposables, and in particular disposable syringes, should never be discarded into dustbins unless they are first rendered unusable, eg by breaking them across the piston and seating of the needle. Otherwise they may be taken to rubbish dumps and fall into the hands of children or drug addicts. Doctors using disposable syringes on home visits should be responsible for removing the syringes and arranging for their disposal or breaking them, before leaving them with the patient. Methods of disposal of disposables are discussed under 'Plan of work in surgery' on page 49.

Less simple alternatives are:

2. Sterile equipment provided by a CSSD, or
3. Sterile equipment provided by a local hospital | Returned after use

4. Sterilization at the surgery. When this last is unavoidable one of the two following methods may be used:

(a) Hot air sterilization in a domestic oven heated by coal, gas or electricity, or in a sterilizing oven conforming to British Standard 3421:1961. Not all the sterilizing ovens on the market conform to this standard, and those which do not should be avoided as their performance is likely to be unsatisfactory.

(b) Steam sterilization in a pressure cooker or an autoclave. Small autoclaves suitable for surgeries are now obtainable. British Standard 3970 (Parts III and IV) for sterilizers of this kind is in preparation. Small autoclaves are of the downward displacement type and may be used for the sterilization of unwrapped instruments. They are not suitable for the sterilization of dressings which require a high vacuum autoclave to prevent wetness. High vacuum autoclaves are not made in small sizes.

Grabame (1958) has described the use of a pressure cooker and a domestic oven for sterilization.

The Medical Research Council's recommendations for sterilization are:

45 minutes at 160°C dry heat (in an oven).

15 minutes at 121°C or 10 minutes at 126°C in steam (in an autoclave or pressure cooker).

Thermometers and thermostats are not always a reliable guide to the temperature inside the load. Satisfactory time-temperature combinations in a steriliser may be checked by the use of Browne's steriliser control tubes. These are supplied in different styles, indicated by spots of colour on the end, for different ranges of temperature. Type I, Black Spot, is suitable for steam sterilization at 121°-126°C and Type III, Green Spot, for ovens at 160°C. The small sealed tubes, about two inches long, contain a fluid which is red before exposure to heat. The colour changes to green after exposure to sufficient heat for a time long enough to produce sterility. One Browne's tube inserted in the centre of each load of equipment in a steriliser may be used to check the effective working of the steriliser and the accurate timing of the process.

Disinfection

Boiling water 'sterilizers', more correctly called boiling water disinfectors

Inverted commas are used here as a reminder that the title is misleading. Boiling water cannot be depended upon to produce sterility. Bacterial spores may survive in a temperature of 100°C. Unfortunately many of these so-called 'sterilizers' are still in use and some are being advertised for sale despite numerous warnings, including that published in Hospital Equipment Information No. 28 of September 1969. Boiling water disinfectors may be useful as a substitute for chemical disinfectants but, as they have the disadvantage of producing clouds of steam a practitioner buying new equipment would be better advised to choose a pasteurizer instead.

Disinfection by pasteurization

Immersion in water at not less than 65°C for 10 minutes or in boiling water for 5 minutes will disinfect equipment by destroying vegetative bacteria (including acid-fast varieties), most fungi and viruses, but not bacterial spores. A pasteurizer is fitted with a thermometer, timer and time lock. It is set in motion after it is closed and it cannot be opened for the removal of equipment until the process is complete. A pasteuriser produces very little steam.

The efficacy of a boiling water disinfector will depend entirely on conscientious staff as there is no independent method of checking as for ovens and autoclaves and no timing device. Careful supervision of the process is required.

It must be understood that neither a boiling water disinfector nor a pasteurizer sterilizes equipment.

Softened or distilled water should be used in both.

Disinfection by chemicals

This is less dependable than heat treatment. Chemical disin-

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[illegible]nts vary in the range of their antimicrobial activity. Most of them will destroy vegetative bacteria except the acid-fast such as tubercle bacilli. Some cannot be depended upon to destroy fungi and there are at present no recognized tests for virucidal activity. A few chemical disinfectants may destroy some bacterial spores but to do so require prolonged contact. They have the disadvantage that they are all inactivated to some extent by a variety of materials including hard water, incompatible detergents or soaps, some plastics, cork, mophead materials, gauze bandage, lint, blood, pus, urine and faeces. Some deteriorate after dilution and allow the survival and growth of micro-organisms. Bacteria have been known to grow in bottles containing a neat chemical disinfectant.

In spite of their many disadvantages chemical disinfectants are useful for the decontamination of items of equipment, such as thermometers, which would be damaged by heat; they also offer some protection to workers who clean equipment which is soiled with infected material.

Cleaning is in itself a useful method of disinfection. Ordinary domestic cleaning of a high standard will adequately disinfect the floors and sinks in the surgery. Normally cleaning of equipment should precede disinfection by heat or by chemicals for greater effectiveness. Where contaminated equipment could infect staff responsible for washing it pre-soaking in a chemical disinfectant is recommended.

No one chemical disinfectant is entirely satisfactory for all purposes. All have some disadvantages and there is a wide variation in price. A Committee of the Public Health Laboratory Service (1965) has recommended *hypochlorites* or 70 per cent *alcohol* for the surface disinfection of clean objects and a *clear soluble phenolic* or *white fluid phenolic* for general disinfection. Where tubercle infection is a risk one of the phenolics should be chosen. *Diguanides* are also recommended (Kelsey, 1970).

In general *phenolic disinfectants* are inactivated by organic material to a lesser extent than are *hypochlorites* and the *diguanides*, but phenolics may be absorbed by rubber which then becomes sticky and likely to burn the skin after prolonged contact. *White phenolic fluids* are normally cheaper than *clear soluble phenolics* but have a more powerful odour and may be more difficult to wash off glassware. *Lysol* is not recommended owing to its caustic nature.

The limited information available suggests that *hypochlorites* are effective against all groups of viruses. To minimize the risk of hepatitis, therefore, a hypochlorite disinfectant is suggested for the treatment of all equipment and surfaces contaminated with blood. To overcome the disadvantage of its inactivation by blood it should be used in very high concentration.

Most *hypochlorites* corrode metals, including some stainless steels, so metal items should not be left to soak in a hypochlorite which is not specifically described as non-corrosive.

Disinfectants should always be measured accurately when dilutions are prepared. Guesswork may be unsafe. Disinfectant dilutions should be freshly prepared each day in clean containers which have been disinfected by heat. This will prevent the carry over of a few resistant organisms which otherwise may survive and grow in the fresh dilution and provide a source of infection or contamination.

Detergents and disinfectants

A disinfectant may be totally inactivated by the presence of an incompatible detergent. Phenolics and hypochlorites are compatible with anionic detergents such as the teepols which may be used at 1·0 per cent. They are also compatible with non-ionic detergents and with soap. The diguanides listed contain cationic detergents; if extra cleaning power is required the addition of anionic detergents or soap should be avoided. Alcohol is recommended solely for the disinfection of clean objects where a detergent is not required.

Some disinfectants are named as follows, with concentrations appropriate for use. The list is not exhaustive.

Suggested disinfectants

Type	*Example*	*Use at a dilution of* %
(a) White phenolic fluids to British Standard 2462:1961 type WG or WF (for general purposes)	Izal	1·0
(b) Clear soluble phenolics (for general purposes)	Clearsol	1·0
	Hycolin	1·5
	Stericol	2·0
(c) Hypochlorites		
(i) For clean surfaces 200 ppm available chlorine	Chloros	0·2
	Domestos	0·2
	Diversol BX* used at 1 oz/gallon water	
(ii) For general disinfection 1 000 ppm available chlorine	Chloros	1·0
	Domestos	1·0
	Diversol BX* used at 5 oz/gallon water	
(iii) For equipment soiled with blood, extra strong: 10 000 ppm available chlorine	Chloros	10·0
	Domestos	10·0
	Diversol BX* used at 50 oz/gallon water	
(d) Preparations containing diguanides	Resiguard	2·5
	Savlon	2·5
(e) Alcohol		
(i) For work surfaces	Industrial methylated spirit	70·0
(ii) For the skin, or instruments in contact with the patient	Isopropyl alcohol	70·0

*Diversol BX is said to be non-corrosive.

Recommendations for sterilization and disinfection

Diagnostic instruments: auroscopes, proctoscopes, laryngoscopes, oral, nasal and vaginal specula, ear syringes (Disinfection)

(a) After use discard into bowl containing disinfectant and compatible detergent in hot water.
(b) Wash in the same mixture after dismantling whenever possible.
(c) Rinse in hot water.
(d) Disinfect in pasteurizer.
(e) Arrange in rack to dry.

Dishes and bowls (Disinfection)

1. If using disposables, discard after use. Otherwise use stainless steel; it is preferred to enamel, which is difficult to clean when chipped.
2. If not using disposables:

(a) Wash in detergent and hot water (b) Rinse in hot water (c) Arrange in rack to dry	After surgery
(d) Disinfect in pasteurizer (e) Arrange in rack to dry	Next morning, before surgery

Dressings (Sterilization)

Use:
1. Packs of pre-sterilized disposable dressings on drug tariff;
2. Drums made up by nurse for sterilization at local hospital; or
3. Hot air sterilization in oven (not in autoclave or they will be wet).

Scalpels (Sterilization)

Use:
1. Pre-sterilized disposable blades and handles;
2. CSSD or local hospital service;
3. Hot air sterilization in oven; or
4. Steam sterilization in pressure cooker or autoclave.

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