Ir. J. Med. Sc.
April, 1964, pp. 177-181
Printed in the Republic of Ireland

THE ORGANISATION OF A REGIONAL CENTRAL STERILE SUPPLY SERVICE*

By CAMERON WEYMES, M.B., D.P.H.,

Medical Superintendent, Glasgow Victoria Hospital Group.

THE provision of a Regional Central Sterile Supply Service should not be undertaken lightly. A large number of people will be affected by the change and finance on a considerable scale will be required. It is essential therefore that a definite plan of action is prepared and followed. During the last few years while knowledge and experience have been limited it has been common practice to establish a small C.S.S.D. in one hospital and to allow it to expand its service to other hospitals until it has reached maximum production. This method has many defects and is no longer justifiable. The hospital initiating the service set its own standards. These are sometimes unacceptable to other users. Production methods planned on a " One Hospital " basis often cannot be adopted on a large scale. The most difficult customer to satisfy is the hospital which has had its own small, personal and costly C.S.S.D. and has then been compulsorily changed to a less personal and more standardised Regional Service. For these and for many other reasons a plan should be prepared and agreed before any action is taken.

One must first define one's aim. This could be " To provide suitably packaged sterile materials of acceptable standard at the lowest possible cost to an agreed number of hospitals ". All the adjectives used are important. Packaging must be good. The articles must be guaranteed sterile. A limited range of standardised packs must be agreed. The cost must be acceptable to the user and the C.S.S.D. must know the number, location and estimated demand of its user hospitals.

At this stage one must discuss the factors which influence one in deciding the type of service to be provided.

Of these factors standardisation is probably the most important. Hospitals and the surgeons and nurses in the hospitals have individual preferences. The surgeon must be told clearly what he will lose in the process of standardisation in return for guaranteed sterility. He must for example agree to use a particular swab bundled in tens. He must use a drape of a particular size, material and colour. Experience has shown that the surgeon will readily accept these changes as long as he is not asked to use a standard range of theatre instruments. Theatre sisters are in general reluctant to change until they experience the advantages of removing the preparation and sterilisation of swabs and linen from the theatre. A large C.S.S.D. cannot produce packs for individual hospitals, surgeons or sisters. It is better to abandon the idea of a regional service than to attempt the impossible.

* A paper read at the Section of Surgery, Royal Academy of Medicine in Ireland, on 7th February, 1964.

The next factors to be considered are the numbers of hospitals and their distances from the proposed C.S.S.D. Experience in South Glasgow C.S.S.D. has shown that, provided standardisation is accepted, a large number of hospitals can be served with ward and theatre packs.

This C.S.S.D. is supplying theatre packs to 80 theatres and labour rooms and ward packs to 13,000 general beds. The service will be extended to 100 theatres and 20,000 beds. The most distant hospitals are at present 180 miles apart, but it is intended to extend the ward pack service to the Eastern Region of Scotland. Until recently one delivery van was able to supply 65 theatres and 10,000 beds during a 5½-day week. During the severe winter of 1962-63 all deliveries were made without delay. The cost of transport is 1½ per cent of total cost of C.S.S.D. products. Distance and numbers of hospitals do not in themselves limit the size of a C.S.S.D.

The availability of accommodation must be considered. New building inevitably means a delay of about two years. Changes in production methods are occurring so rapidly that it is probably wiser at present to use adapted accommodation. Experience would indicate that the fewer partitions there are within a C.S.S.D. the easier production becomes. An open area such as a ward, factory or laundry is ideal. Water, steam and electricity are required. Steam can economically be generated on site in an oil-fired boiler.

A C.S.S.D. serving 4,000 beds with ward instruments and ward packs and 50 theatres with operation packs would require an area of approximately 6,000 sq. ft. A C.S.S.D. serving 20,000 beds and 100 theatres would require an area of approximately 11,000 sq. ft. The C.S.S.D. should be cited in the area which has the highest density of hospital beds. It need not be sited in a hospital.

An important factor is the availability of finance for initial capital expenditure and continuing revenue expenditure. It is pointless to equip a large C.S.S.D. if money is not available to buy linen and instruments. It is useless to provide a de luxe service if the hospitals to be supplied find it too costly. The equipment in South Glasgow C.S.S.D. cost approximately £16,000. The cost of priming the pipeline with linen is £400 per theatre or labour room. The ward instrument cost is £3 10s. per general hospital bed. We now have accurate figures showing that the total cost of C.S.S.D. items including disposable items such as catheters and syringes from " trade " sources is approximately 3/6d. per bed per day for a Teaching Hospital and 2/- per bed per day for a District General Hospital. The cost of ward packs and ward instruments is twelve times higher in a surgical ward than in a medical ward.

Having reviewed the factors which influence one in deciding the size and scope of a C.S.S.D. one must assess the relative merits of different sterilising methods. A C.S.S.D. should employ methods which are cheap, reliable and safe. Boiling can be immediately dismissed. It is not reliable and is in any case useless for packaged materials. Gases such as ethylene oxide have been used to sterilise plastic materials. There are technical difficulties involved in its use. The method is slow and the gas is dangerous. There is no rapid check of the efficacy of sterilisation. This method cannot be recommended for C.S.S.D. use.

Irradiation is a reliable method of sterilisation. It is, however, at least three times as costly as steam sterilisation. It cannot be used to sterilise linen as the material is totally destroyed after a few exposures. Its use should be limited to the sterilisation of disposable items such as catheters and syringes. Trade manufacturers operating on a national or international scale can supply these items more cheaply than the largest C.S.S.D. Steam sterilisation using high vacuum high pressure autoclaves is the method of choice for ward dressings and theatre fabric packs. The autoclave must be capable of drawing and holding a vacuum of 29.2 inches mercury and must sterilise at 32 lb. steam pressure. Dry heat from a hot air oven, or an infra-red conveyor belt oven is the best method of sterilising metal ward instruments packed in aluminium tubes.

One must carefully decide what one will produce in the C.S.S.D. and what one will buy from trade sources. This can only be done by comparing trade prices and quality with price and quality of products of C.S.S.D.s of comparable size to the C.S.S.D. it is intended to develop. Unfortunately at the present time the Scottish Western Region C.S.S.D.s are the only C.S.S.D.s known to publish an item price list based on an audited trading account. Western Region C.S.S.D.s adopt the following practices. Syringes, with a few exceptions, are bought presterilised by irradiation from trade sources. Some glass syringes for paraldehyde, insulin and tuberculin are sterilised in the C.S.S.D. by dry heat. C.S.S.D. distribution methods are liable to cause heavy breakage rates. Clinicians consider disposable syringes to be at least as good as glass syringes. The disposable syringe is cheaper than a comparable glass syringe produced in the C.S.S.D. It is technically impossible to clean and resterilise a rubber tube in a C.S.S.D. Our policy is, therefore, to recommend that catheters, gastric tubes, theatre drainage tubes, etc., be bought in plastic or rubber presterilised by irradiation from trade sources. It is recommended that they be used once and destroyed. Theatre instruments are not processed in C.S.S.D. It is recommended that they be sterilised in the theatre preparation room in a high-speed instrument autoclave at 32 lb. steam pressure. Infusion fluid are the responsibility of the pharmacist. Sterile water for topical use may be sterilised in a C.S.S.D. If an aluminium container with a polypropylene release valve cap is used water can be sterilised in a high vacuum autoclave in a half-hour cycle. Ward instruments are easy to sterilise in large quantities in a C.S.S.D. It is difficult to ensure a smooth flow of instruments between user and C.S.S.D. where the pool is larger than 5,000 acute beds and where distances between hospital and C.S.S.D. are great. It is recommended that where a C.S.S.D. covers a wide area and a large number of beds that it should supply ward instruments to local hospitals to a maximum of 5,000 beds. The remaining hospitals while getting ward packs and theatre packs from the C.S.S.D. can receive ward instruments from selected supplementary centres. In Western Region there are four such centres each serving about two to four thousand beds. They are run by hospital pharmacists using the equipment used by the now obsolete syringe services. The C.S.S.D., therefore, restricts its activities to sterilising ward instruments, ward packs and theatre packs. Theatre packs are not available from trade sources. Ward

packs of good quality are available from trade sources. If a C.S.S.D. is producing efficiently for 5,000 or more beds it is considered that most ward packs can be produced more cheaply in a C.S.S.D. Only a C.S.S.D. can as yet produce well-packaged units of packs suitable for distribution to ward level. In 1963 Western Region C.S.S.D.s bought 7 per cent of their ward packs from commercial suppliers and boxed and sterilised them in the three C.S.S.D.s.

It is important to decide on the type of ward packs to be produced. A pack containing all materials including instruments required for a certain procedure can be termed a " comprehensive " pack. Where instruments are packaged separately and most frequently singly the method can be called the " item " pack method. Comprehensive packs can only be used extensively if the C.S.S.D. serves one hospital. One cannot produce a new pack until the dirty instruments are returned. This makes production " day to day ". On the " item " system one can produce ward packs in production " runs " lasting a day or more and one can stockpile a month ahead. Ward pack production can close for a two-week holiday, or release assistance when sickness depletes the sections producing ward instruments and theatre packs. The " item " system must be adopted in large-scale C.S.S.D. production.

When the interested parties have discussed the factors and problems outlined they must take action in the following sequence.

An individual with or without a small advisory panel must be appointed to direct the activities of the C.S.S.D. The duties of Director are largely administrative, but it is desirable that he be a doctor of senior status. He should be interested in the problem of " cross infection " and modern theatre technique. He must understand how a modern autoclave works. He must have authority to make at least day-to-day decisions. If he is competent he will do better without an advisory panel. Where an advisory panel, or executive committee is appointed to run a C.S.S.D. it should be small and expert. No attempt should be made to represent even partially the user hospitals. A suggested committee might comprise a medical administrator, an interested consultant bacteriologist, a senior finance officer, a senior experienced engineer and an interested senior nursing officer. It is difficult to be more specific than this without knowing the local chain of administration and finance.

The next step should be to appoint a C.S.S.D. superintendent. This should not be delayed until shortly before the C.S.S.D. opens. A superintendent must be capable of organising the activities of an unskilled staff of up to 50. It is of value if the person understands the background of usage of C.S.S.D. products. The ideal choice in establishing a C.S.S.D. is a registered nurse who has had wide experience in ward and theatre. She is much more readily accepted by doctors, matrons and sister tutors if she speaks a common language.

The director and superintendent must now produce a detailed list of proposed items which the C.S.S.D. will produce. Today this list of pack contents can best be prepared by studying the products of established C.S.S.D.s Packs have been produced by the million and tested and modified over several years. This vast experience should not be ignored and the wishes of influential individuals preferred. It is easier

and more acceptable to introduce something new to twenty hospitals than to adopt the practice of one of the twenty. The list of items produced must be agreed by the proposed users. No further action should be taken until this agreement has been reached.

The director must now decide on his production methods. In " item " production there are three work flows—ward instruments, ward packs and theatre packs. The details of production do not directly concern the user, but those interested can study the methods in " Planning a Regional Central Sterile Supply Service."

Suitable accommodation must be selected and adapted. Fixed equipment must be ordered and installed.

A planned development of the service must be agreed. The availability of capital funds will affect this plan. If money is limited, cross infection can be most rapidly controlled by reducing infection arising in the theatre. This can be effected by giving priority to the provision of theatre packs. Hospitals must be warned of the date when they can expect to receive the service. Four hundred pounds must be provided for linen for each theatre or labour room entering the service and £3 10s. for each general bed.

C.S.S.D. staff must be appointed as the service develops. Unskilled labour should be used. It is cheaper and better. Intelligent people do not readily adapt themselves to simple repetitive procedures.

Once production is established item costs must be produced. It is necessary in addition to providing a balance sheet to cost accurately each item. If this is not done one might be overcharging a maternity hospital and undercharging a casualty department.

I hope I have made clear the difficulties as well as the advantages in establishing a large scale cheap Central Sterile Supply Service. As major users surgeons must be interested in this service. If collectively you are prepared to give as well as take, large scale C.S.S.D. is possible and to the director easy. If you feel that the degree of standardisation required is too high a price to pay for guaranteed sterility and cheapness it is better to plan C.S.S.D.s on a hospital basis.