necessarily have any pathological or aetiological connexion at all. Go to Dakar and you will see anything up to 13 patients lying in the ward with primary carcinoma of the liver and perhaps 9 of those will have no cirrhosis at all.

Dr. BOOTH: Experimentally the factors which produce "nutritional" cirrhosis in the rat may also produce liver tumours. So there is good evidence that the same sort of thing as is liable to produce cirrhosis in an animal can produce hepatic carcinoma.

Dr. DAVIES: I would agree. I think that cirrhosis and carcinoma may both be manifestations of the same

aetiological agencies, but I don't think the connexion is necessarily—in fact it is surely not—from normal via cirrhosis to carcinoma.

Dr. BOOTH: You mean you don't believe in the suggestion that it is a regeneration nodule "gone wrong"?

Professor McMICHAEL: We shall have to discuss that again another day.

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PLANNING A RESPIRATORY UNIT

BY

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A new respiratory unit at the Prince Henry Hospital has recently been opened. The necessity for this service was urgent because of an outbreak of poliomyelitis in which there was a high incidence of respiratory and bulbar involvement.

The need for such a unit in major hospitals is now well recognized, as it is accepted knowledge that anoxia and underventilation represent the terminal phase of many acute illnesses. However, if this anoxia and underventilation can be corrected before irreversible damage has occurred, then the patient will have a better chance of recovering from the original disease process. Considerable interest is being shown in the development and operation of such units, but few have yet been constructed. This one has various new and original features, and I believe it is worth while providing a general description of its several characteristics. Neither time nor money was available to construct a new building; consequently it was necessary to convert an existing ward unit. This was a large open ward nearly 100 ft. (30.5 m.) long, 10 beds on each side, and doors alongside each bed, opening out on to long open balconies 9 ft. (2.7 m.) wide.

General Considerations

The following considerations were borne in mind when organizing and planning this respiratory unit.

Location.—Intensive care, both by doctors and nurses, is required 24 hours of the day; patients may be transferred at short notice from any ward; essential services must be available constantly; special procedures—for example, x-ray pictures and pathological tests—may be required at any time. These facts indicate that this unit is one of the most active areas in the hospital; hence it is desirable to have it centrally located.

Ward Planning.—Patients admitted to this area have their airway and ventilation threatened; death is always near at hand. Constant surveillance is essential, and without it the mortality rate will increase. Observation of the patient's breathing, his colour, aspiration of secretions from the throat and lungs, and the integrity of all connexions to a respirator are the prime and constant considerations in their management. Hence it is essential that the unit design should be based on an open-plan area. One or two single sound-proof isolation-rooms are very useful for such patients as those with tetanus and those moribund on admission, or for other special cases. Fig. 1 shows the general disposition of the unit; it will be noted that the majority of beds are grouped around a central nursing station. The 18 beds are divided into units of eight beds, six beds, two beds adjacent to the sister's station, and two single rooms. The first 16 beds can be observed readily at all times by the sister in charge. The ward partitions are glassed in above a height of 3 ft. 6 in. (106 cm.), but those of the single rooms are glassed in above 8 ft. (244 cm.).

Air-conditioning.—This is necessary for providing a comfortable temperature, bacterial filtration of the air, and the maintenance of a high humidity. The high humidity is important for preserving the tracheal mucosa in patients with open tracheostomies; dry air results in thick, viscid tracheal secretions with encrustation and occasional bleeding, thus providing an ideal medium for infection and atelectasis; adequate humidification prevents the development of this dangerous sequence of events.

FIG. 1.—General plan of beds and services required for the respiratory unit. Note the adjacent renal dialysis area and a recovery ward.

Lighting and Power.—Most patients are lying horizontal, looking towards the ceiling; thus indirect general lighting for the ward is more pleasant. Incandescent lights are necessary because all types of fluorescent light give the patient a false colour; this is not only undesirable but may also be dangerous. An overhead light is needed for each patient so that the various

ment with this important principle; these people cannot be managed safely and adequately if their heads are placed towards the wall.

The services required for each individual patient are: a respirator; suction—suction bottle; oxygen; compressed air; two 240-volt power plugs on separate circuits; containers for sterile and used catheters, sterile forceps, and sterile water; a humidifier; nurses' call system; radio or T.V. communication; an overhead light; and a nurses' dressing or service tray. All of these must be kept off the floor, and they must all be accessible and not in any way obstruct the efficient nursing and management of the patient.

The method of bringing these services to the patient and their relative disposition represents the most important feature in the whole unit. These problems were presented to Mr. V. R. Ebsary, of Ebsary Pumps Pty., Ltd., Brookvale, Sydney, who very graciously and kindly designed and constructed the whole of the service units to each patient; and, what is more, the whole design, production, and installation was completed in four weeks (see Figs. 2 and 3).

Retractable Service Panel

An overhead beam of robust, rigid construction carries all the essential services for the patients. From this beam they are delivered to the patient by a retractable panel, which brings them to a position where all the services are most accessible and most needed. This unit is normally in use, but may be left retracted and flush in the overhead beam if it is not required or if the bed is not in use. Then by simple connexions the various attachments—for example, sucker bottle, humidifier, nurses' tray, and respirator—may be added to this service arm when required. In this way all the servicing arrangements and nursing requirements are kept well above the floor, which is unobstructed for cleaning and nursing (see Fig. 4).

Various warning signals, by lights and buzzers, are given in the sister's station in the event of any threat to essential supplies and services; it has been deemed necessary to have reserve supplies of oxygen, compressed air, and suction available in the event of any breakdown.

FIG. 2.—Showing a retractable service panel extending from a rigid overhead main supply beam. The foot of the panel conveys suction, oxygen, and compressed air, while on the main arm there are two 240-v power points, a nurses' call attachment, and a radio selector with volume control.

nursing procedures may be facilitated. Power plugs of 410 volts for x-ray equipment, and 240 volts for other equipment and services, are required at various locations in the area.

Hand Wash-basins.—Cleanliness and frequent hand-washings with antiseptic soap solutions are essential. Insistence on this procedure must be relentlessly drilled into each resident, nurse, physiotherapist, and all other attending personnel. One hand wash-basin is adjacent to each bed (Fig. 1), each with its soap and paper-towel dispenser, plus a container for used towels attached to the wall, well up off the floor.

Cleaning.—The floor surface must be as free as possible from areas where dust might collect; this has been achieved with plastic tiles. Coved edges from the floor join to wall tiles, which extend to a height of 4 ft. (122 cm.). Constant wet-mopping with bactericidal solution is undertaken at frequent regular intervals. All dirt and rubbish is removed by vacuum cleaners with bacterial filters.

Services to Patients

It has been found absolutely essential for the proper care and supervision of patients, either in a tank respirator or dependent on a positive-pressure-respirator, that their heads should be placed towards the centre of a ward. Every single attending person here is in agree-

FIG. 3.—Detailed view of the components attached to each service arm.

All the respirators have fittings interchangeable between the oxygen and compressed-air outlets; we believe that with this arrangement we should cope with most emergency situations regarding supply or power failure.

Care of Equipment

The cleaning, preparation, and sterilization of all equipment used in the unit is supervised by a trained nurse, who has these activities carried out in a special area. A large amount of the materials used in modern equipment is plastic, and this cannot be boiled or

prior to cleansing, autoclaving, and storage. Fouled linen needs treatment and soaking with bactericidal solutions before dispatch to the laundry. Deep stainless-steel sinks, one with a cover for storing pans during treatment, a pan-washer, autoclave, and storage facilities are the basic requirements in this area.

Clothing.—At the entrance to the unit there is an air-lock for the air-conditioning control. The doors leading to and from this area are semi-transparent, plastic, and spring-loaded, enabling patients and trolleys to be pushed straight through them. Facilities for washing hands and changing into a clean gown and mask are provided in this area. All persons entering are required to exercise this simple precaution for their own benefit as well as that of the patient.

Summary

Throughout many countries there is a rapidly increasing awareness of the life-saving role afforded by well-organized respiratory units.

Doctors, nurses, and physiotherapists are required 24 hours of the day. Constant surveillance is a prerequisite for recovery; x-ray pictures and pathological tests may be required at any time; patients may be urgently transferred from any hospital ward; the unit should therefore be centrally located. Because every patient must be under observation by the sister in charge, the unit should be based on an open-plan area.

Patients' heads should be placed towards the centre of the ward, and to this area all the essential nursing services must be delivered. This has been achieved from a central overhead duct to which a retractable service arm of robust, rigid construction is located. This arm conveys these services directly adjacent to the patient's head; attached to it, up off the floor, is all the mechanical, electrical, and nursing equipment needed for respiratory management.

High humidity air-conditioning, indirect lighting, adequate wash-basins, floors and walls washable with bactericidal solutions, are all of importance in effective care of patients.

A description of the service areas for food, linen, laboratory, sterile stores, equipment, and staff, are also presented.

FIG. 4.—General view of the respiratory unit, illustrating the overhead duct systems with the retractable service panels adjacent to the head of each patient. Two East-Radcliffe respirators are on the floor in the foreground.

autoclaved as it immediately goes out of shape. Special facilities for cleaning suction catheters and rubber tubing are provided. A set of nozzles, graded in sizes, are used for washing these articles with high water pressure. The articles are then attached to a similar set of nozzles through which compressed air is blown to dry them out before they are packaged ready for sterilization. All plastic, rubber, and perishable materials are sterilized, using ethylene oxide gas, which has no effect whatsoever on the physical characteristics of any plastic material. The sterilized articles are then kept in a sterile store area, adjacent to the centre of the ward and adjoining the linen store (see Fig. 1).

Laboratory and Storage.—The calculation and estimation of physiological data related to the care and assessment of the patients is performed in an adjacent laboratory. The storage of special items of equipment necessary for estimating pulmonary function and the teaching of nurses, students, and residents is also undertaken in this area. A storage area for tank respirators and other large items is situated underneath the ward.

Food Preparation and Care of Utensils.—All the used utensils, china, silverware, etc., are taken from the patients into a small room adjacent to the kitchen. Here all waste is dispatched via a "Wastemaster"; and the utensils are washed, packed in trays, and then automatically cleaned and sterilized before direct passage via a "pass-through" to the main kitchen.

Pan Room.—Bedpans and urinals may first require treatment of their contents with bactericidal solutions

The *Hospitals Year Book for 1963* has now been published by the Institute of Hospital Administrators. The hospital directory sections give full particulars of hospitals and hospital authorities in Great Britain, Northern Ireland, and the Isle of Man. Other sections provide details of bed and patient statistics, hospital finance, Government departments and statutory bodies, organizations concerned with hospital and health services, local health authorities, executive councils, the N.H.S. Whitley Councils, and hospital contributory and provident schemes. The reference section includes notes for hospital administrators on legal, technical, and general subjects, as well as detailed indexes to statutory instruments and official circulars, summaries of reports, and a short bibliography of hospital literature. The final section consists of a guide to hospital purchasing. (Obtainable from I.H.A., 75 Portland Place, London W.1, price 63s., or 66s. with packing and postage.)