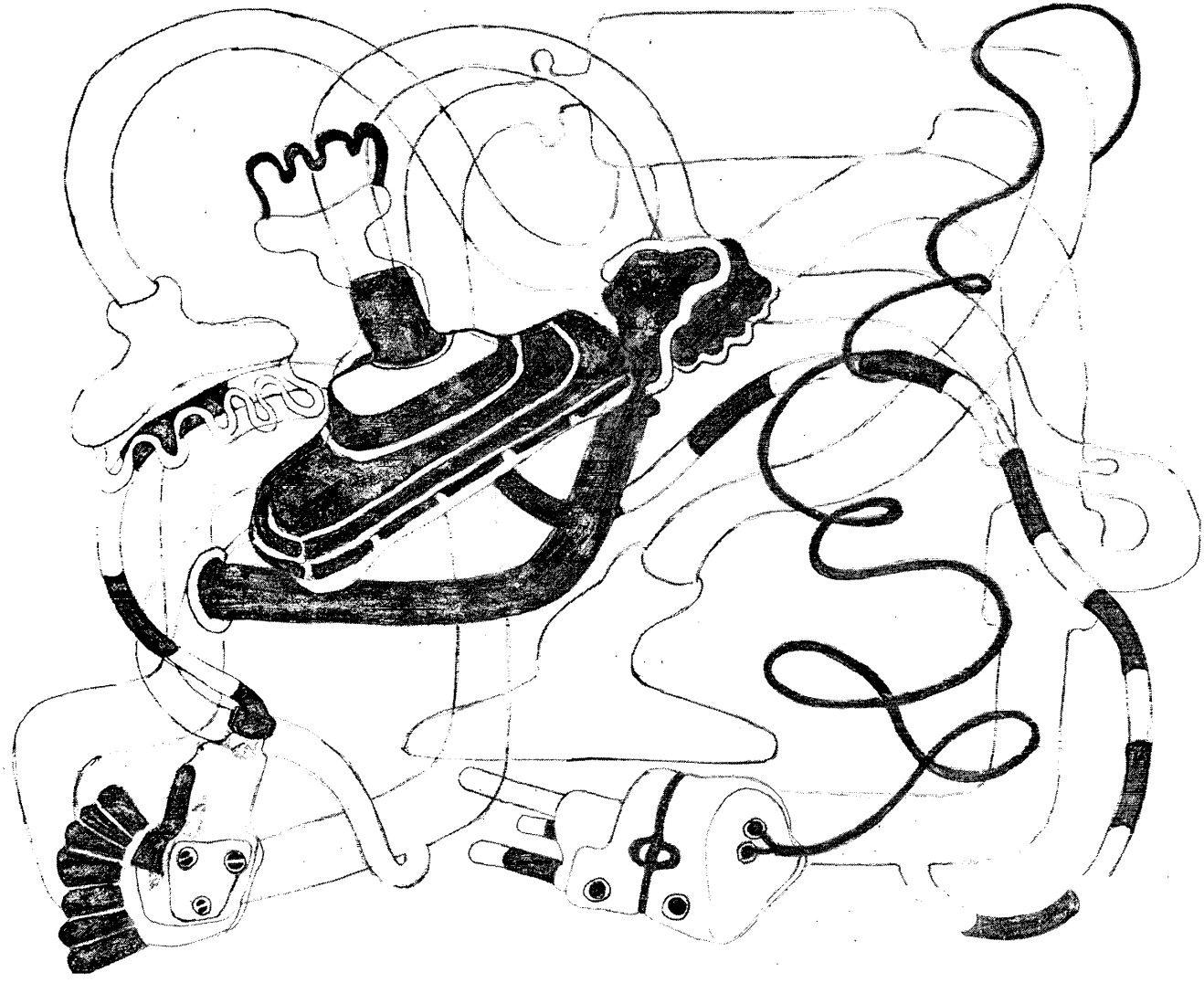
A King's Fund Report
Central Vacuum Cleaning Systems



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Central Vacuum Cleaning Systems

An enquiry into the advantages and disadvantages of such systems compared with those of other methods

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Definition of terms

Vacuum cleaner	The large domestic or small industrial type electric suction cleaner used in many hospitals.
Central vacuumation	A built-in system of pipe lines which runs to a central dust disposal unit. Dust is picked up with the familiar vacuum cleaner tools attached to hoses, usually 20 or 40 feet long, which plug into the system.
Domestic or domestic staff	The member of the staff using the equipment.
Domestic administrator	The member of the staff responsible for all cleaning services (described in the United States of America as the housekeeper).
Self burnishing polish	Polish which is either sprayed on or applied with a lambswool or similar applicator, requiring no mechanical buffing by polishing machines which are noisy and can cause other disturbances.

Origin and nature of the enquiry

At the request of the Ministry of Health, King Edward's Hospital Fund set up a working party in the autumn of 1964 to enquire into the advantages and disadvantages of using in hospitals a central vacuum cleaning system as opposed to individual vacuum cleaners.

The request arose because an increasing number of hospital authorities wished to install central vacuumation in new buildings, taking its obvious merits into account but apparently not giving adequate consideration to the way in which it would be used. In view of the initial cost a more detailed appraisal seemed desirable.

Visits were made to most hospitals which already had an installation in operation so that it could be seen working and discussions could be held with administrators, engineers, nursing staff and domestic administrators who had practical experience of the system.

The relevant literature, particularly that concerned with cross infection, was carefully studied; conversations were held with leading manufacturers; and the Ministry of Health provided a considerable amount of detailed information.

One of the difficulties which confronted the working party was the difference in cleaning techniques between one hospital and another. Another difficulty was the variety of types of floor covering in use. It became apparent that it would be necessary to express an opinion on cleaning generally and the type of floor covering considered desirable as well as on vacuum cleaners and vacuumation.

Findings

Resultant cleanliness

The mere provision of up-to-date mechanical aids does not ensure cleanliness. Equally good or bad results may be achieved in a variety of ways and it would be stupid to claim that any one is the best. Provided that the method used is hygienically acceptable, good results are achieved where there is good supervision, adequate training and a good domestic.

Freedom from turbulence and cross infection

Dust contains spores of bacilli and fungi from soil and micrococci from skin and hair. In wards or other places occupied by patients, streptococci and staphylococci are also likely to be found.

This dust is disturbed by people moving about, by swing doors, by draughts from open windows, by bed making and by cleaning operations. As it is virtually harmless until such time as it is airborne it is important that cleaning should not merely stir up the dust but remove it. This is efficiently done by both vacuum cleaners and central vacuumation.

With a vacuum cleaner the dust and air is passed through a suction cleaner which is a self-contained filter/blower system. Provided that such cleaners, whether domestic or industrial, are of a design satisfactory for hospital use and are properly maintained, the bacteriological count in the

exhaust air is substantially below that in the ward air. Indeed this exhaust air should not contain more than one bacteria-carrying particle in every five cubic feet.

With central vacuumation a motor driven exhauster totally extracts the dust and air from the area being cleaned through pipes, thence through a dust collector–filter–separator, finally discharging it at high level.

Either method is satisfactory but stricter discipline is necessary with vacuum cleaners to ensure that they are being properly emptied and maintained.

Noise and other disturbances

There is little to choose between central vacuumation and vacuum cleaners as far as noise is concerned: both may disturb those patients who find any sort of noise trying. Most patients regard the process as normal or at any rate essential and are not unduly worried by it, providing it is done at reasonable times of the day.

The central vacuumation plant is noisy and care must be taken to silence the plant room and the exhaust. Silent hose points should also be specified.

Waste disposal

The dust collected by central vacuumation may be disposed of simply and safely. If the plant room is in the vicinity of lift shafts or staircases which go up through the hospital, care in moving the bins is necessary. The filtered air must be discharged at high level.

Removing dust from vacuum cleaners involves considerably more work and must be a well disciplined operation to prevent any scattering of the dust and bacteria already collected and to protect the domestic herself from unnecessary risk of infection.

Effects on staffing

It will not be possible to reduce the domestic staff by introducing central vacuumation although the engineer may benefit slightly and may well prefer looking after one large plant rather than many small ones.

Effects on nursing practice

Provided that a good working relationship exists between nursing and domestic staff the method of cleaning has little effect on nursing practice. It is usual for special arrangements to be made for "isolation" patients whatever the method. Essentially the ward sister must feel confident that the ward is clean and that the normal routine keeps it that way.

Hindrance to movement of trolleys, beds, etc.

If the domestic is well trained and observant she should have no difficulty in keeping her equipment out of the way of beds or trolleys being moved about. When using central vacuumation she will have to be particularly careful when the long hose is stretched across corridors or doorways, as it has to be from time to time, and may have to stop work to move it out of the way.

Storage

There is little difference between the space required to store a vacuum cleaner and the central vacuumation hose.

Both require similar attachments. Central vacuumation requires a plant room, vacuum cleaners may require a room where they can be emptied and cleaned.

Reliability

Central vacuumation plants are reliable and will give virtually trouble-free service for many years. They may be regarded as part of the building services. However, some troubles have occurred when time clocks switch the plant on and off automatically, and with the use of remote control switches. Vacuum cleaners must be properly looked after and should be replaced before they become uneconomical to maintain. Small machines may be expected to last five years and larger ones eight.

Costs

Central vacuumation costs approximately 1s. 6d. per square foot to install. For a period of 20 years vacuum cleaners could be provided at a cost of between 4d. and 6d. per square foot of building depending on the size of machine.

The initial cost of providing central vacuumation for the wards of an 800 bedded hospital is likely to be about £15,000 while vacuum cleaners could be provided for 20 years for between three and five thousand pounds, the expenditure being spread over 15 or 16 years.

Running and maintenance costs of central vacuumation are likely to be at least double those of individual machines.

Flooring

It is possible that the most satisfactory type of floor will be welded P.V.C. or sealed linoleum, which may not require vacuum sweeping but only damp mopping. Apart from the marking caused by cigarette burns, welded P.V.C. is a floor which will stand intensive hard wear, and it has already been adopted as standard flooring by the Leeds Regional Board.

Conclusion

It is very expensive to install central vacuumation. It has only one major advantage. The dust exhausted is removed to a central point and only one or two bins require emptying. This advantage will only remain if the dust collector is carefully sited and neither it nor the bins are adjacent to or have to be carried past staircases or lift shafts which act as chimneys as they rise through the hospital.

As with all equipment requiring heavy capital expenditure it is unlikely to be economic unless it can be used to capacity. One can hardly advance this claim if the plant is used for one or two hours each day, and if it is used for one purpose when it can be used for more. Neither is it easy to justify such an installation if it is only regarded as a secondary method of cleaning; that is to say if daily floor scrubbing or damp mopping is considered vital, or if damp dusting and frequent wall washing are necessary. At the present time, where ward floors are efficiently suction-cleaned daily, there are staggering differences in their additional treatment. In one hospital

they are scrubbed daily, in another once every six months. Some floors are sealed, others are not, some are polished either by machine or with self burnishing polish, others are not. These variations, occurring in hospitals with a high standard of domestic administration, do not seem to affect the incidence of cross infection. Certainly the bacteriological count on the floors is as effectively reduced in wards taking less than four hours to clean as in wards taking fifteen hours.

There are unlikely to be more domestic staff available in future, indeed there will probably be far fewer. Such shortages can frequently be overcome by some kind of automation. This could only point to the introduction of central vacuumation if it used less labour in cleaning, supervision and maintenance.

We are of the opinion that a case can be made for such an installation but only where a hospital authority plans its cleaning so that the greater part of all floor cleaning, dusting and wall cleaning will be by central vacuumation rather than by scrubbing, damp dusting and washing. Some care in the choice of installation is necessary as not all equipment is light enough to be handled easily by women cleaners. As vacuum cleaners have a life of from five to eight years, they are more flexible and may be regarded as a more attractive proposition since one is committed for the life of the machine rather than the life of the building.

Appendices

A Central vacuumation design requirements

Any properly installed plant will remove dust from the areas where it is designed to operate. For hospital use the specification should be drawn up to include the following.

1 Provide an adequate number of silent hose points so positioned that doorways and corridors are not obstructed more than is absolutely necessary.
2 A vacuum breaker is necessary to avoid overheating the bearings.
3 The plant room should be well silenced and ventilated. It should be situated well away from lift shafts or staircases which rise through the building, but conveniently for refuse disposal.
4 The exhaust air should be piped to high level, a silencer should be fitted and it should be remote from any fresh air intake or windows.
5 Plastic exhaust lines should not be specified as they create an electro-static effect which attracts dust and can interfere with electronic equipment.
6 Lightweight tools and the latest variety of lightweight hose should be provided so that female domestic staff can make full use of the installation.

B Choice of vacuum cleaners for ward use

Only those vacuum cleaners complying with the following should be used in wards.

1 Simple dust removal from the vacuum cleaner preferably in a disposable bag.
2 Suction power in accordance with British Standard 3028:1958.
3 At least two layers of efficient filter, within the body of the machine and on the input side of the air impellor.
4 The exhaust jet should be well diffused by a device which is either part of the machine or is difficult to remove from it.

C Sources of information

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