Support Services

Priority for maintaining essential medical equipment

Michael Cheng

Increased attention should be given to training technicians in the maintenance of the essential medical equipment of district health facilities in developing countries.

Basic medical equipment is widely used in the district health facilities of developing countries to support primary care. If its full potential is to be realized it clearly has to be properly maintained, something that frequently does not happen. The growth of maintenance services is not keeping pace with the deployment of equipment.

Special attention should be given to the training of technicians and the establishment of workshops at district level. The sort of training that is required is less time-consuming and costly than that given to technicians for the maintenance of complex equipment.

An empirical model

Fig. 1 represents a country’s inventory of medical equipment; height indicates complexity and width indicates quantity. The pyramidal shape reflects the fact that items of simple equipment greatly outnumber complex items: clearly, for example, there are more stethoscopes than lasers.

Fig. 1
Diagrammatic inventory of medical equipment

The simpler items (near base of pyramid) greatly outnumber the more complex items (middle and near apex).

Dr Cheng is a consultant in health technology management; his address is 145 Carleton Avenue, Ottawa K1Y 0J2, Canada.
basic equipment (in area B); ba shows the higher cost and more time needed in training to take care of more complex equipment (in area A).

The pyramidal model suggests a strategy for tackling the problem of maintaining medical equipment: priority should be given to training technicians to maintain the relatively simple but abundant items of essential equipment commonly found in district health facilities. This approach offers advantages in respect of cost, time and the numbers of people who benefit from it.

The middle-level technical expertise that exists in established workshops can be used to provide training locally. Candidates for training can be recruited in substantial numbers because the requirements for selection are not too stringent. The widespread use of basic equipment makes it possible for apprentices to provide services at the same time as they are undergoing training in health facilities. Furthermore, a pool of technically skilled people at this level can be expected to contain individuals suitable for more advanced training.

The alternative of providing advanced training for personnel in established workshops, without an expanded backup work force, would require selecting candidates who already have middle-level skills and sending them away to be trained. This would be bound to lead to the disruption of services. Some technicians would go from one overseas training programme to another and would have little time to deliver services in their home countries. Some would be lost through emigration or transferring to new employers.

Ideally, the maintenance of medical equipment should be tackled at different levels simultaneously, and a comprehensive long-range strategy has been drawn up to this end (1).

Where resources are limited, however, it may be desirable to apply the above pyramidal model, as, indeed, has been happening in Bangladesh, Morocco and Viet Nam, where
policy-makers are being helped to review maintenance policies and draw up development strategies that emphasize the establishment or strengthening of maintenance services in support of district health facilities. It should be noted that in countries with budgetary or staffing restraints the private sector should be encouraged to provide such services.

**Bangladesh**

Bangladesh counts on a well-established central workshop and training unit in Dhaka with a staff of 22 engineers and 24 technicians. Between 1986 and 1990, 18 medical equipment maintenance workshops were set up at district level, each staffed by eight persons. In 1990 a review team from the Asian Development Bank uncovered serious deficiencies in the organization and management of the workshops: each district workshop was reporting separately to a local chief medical officer and there was no coordination or mutual support, and the training courses provided by the central training unit were inappropriate.

On the basis of the pyramidal model the team made recommendations that are being implemented in the period 1992–94. The central workshop has been asked to coordinate and support the activities of the district workshops. A management manual is being prepared for use by all districts. Workshop supervisors are given leadership and management training. Training of technicians is carried out by staff of the central workshop and is concentrated initially on the maintenance of basic essential medical equipment.

A national policy for the acquisition of equipment has been devised. Conditions are to be imposed on donors and vendors of equipment with a view to proper maintenance. Brand variations are to be minimized and suppliers are to be requested to provide operating and maintenance manuals, frequently used spare parts, and training in the maintenance of the more complex items.

**Morocco**

A project on the maintenance of medical equipment began in 1987 with assistance from the United Nations Development Programme (UNDP), whereby two comprehensive workshops located in teaching hospitals were to be set up and used as models. Dissatisfaction with the progress attained led in 1989 to the use of the pyramidal model to illustrate the need for change.

It was decided to establish a network of smaller workshops across the country. New technicians were recruited and were trained by personnel employed in the established workshops. After a year the technical staff was increased from 7 to 29 persons and seven workshops were functioning. As a result, four additional hospitals gained access to maintenance services. A team of UNDP consultants reported favourably on what had been achieved, and the provision of workshops in additional districts was recommended. Regional service centres are now being established to coordinate the sharing of resources and to support the smaller workshops.

**Viet Nam**

Two national workshops are responsible for the training of maintenance technicians and for maintaining all medical equipment in the
hospitals of Hanoi and Ho-Chi-Minh City, and each of the 44 provinces has a workshop for the maintenance of such equipment. In 1991 a government survey revealed that substantial proportions of basic items of equipment were unusable, and in 1992 this problem was examined in the light of the pyramidal model. As a result it was decided to make proper maintenance of essential equipment in district facilities a principal thrust of an upcoming international assistance project.

If special attention is given to the maintenance of essential medical equipment in support of primary health care facilities, populations at large can benefit comparatively quickly in many developing countries. Skilled personnel in established workshops can be used as local trainers, and it should be possible to lay the foundations for the maintenance of more complex items of equipment.

Acknowledgements
For their comments on drafts of the present article, I thank Dr Stephen Simon, Director of Health and Population Directorate, Canadian International Development Agency; Mr Alan Warren, Executive Director, Ottawa-Carleton District Health Council; and Dr Andrei Issakov, Medical Officer, Division of Strengthening of Health Services, World Health Organization.

Reference