REPORT ON A MEETING OF DIRECTORS/PROJECT MANAGERS OF TRAINING CENTRES FOR MAINTENANCE AND REPAIR OF MEDICAL EQUIPMENT IN THE WHO EASTERN MEDITERRANEAN REGION

Nicosia, Cyprus

7-9 September 1981
The views expressed in this report do not necessarily reflect the official policy of the World Health Organization.
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I INTRODUCTION

The meeting was opened under the chairmanship of Mr C. Vakis, Director-General, Ministry of Health, who gave the address attached as Annex I.

Dr A. Khogali, Regional Adviser, Health Personnel Education, EMRO, then delivered the message of Dr A.H. Taba, Director, WHO Eastern Mediterranean Region. In his message, attached herewith as Annex II, Dr Taba indicated that the aim of the meeting was to exchange views and examine the feasibility of developing a network of training institutions capable of meeting regional manpower needs in the field of maintenance and repair of medical equipment. He emphasized that it is a well-known fact that Member States spend a great proportion of their budget on the procurement of medical equipment needed for the diagnosis and treatment of diseases. With the growth of health infrastructures in order to increase health coverage and the galloping costs of sophisticated equipment, government expenditures for such purchases will continue to become greater and greater.

He went on to say that in general in the health planning and programming in this Region, there is only limited acceptance of what might be called "the concept of maintenance". Too often damaged or faulty equipment is either left to rust and rot, or replaced at great cost, when minimal expenditure on repair could restore it to function. Too rarely do institutions allow, in their budgets, anything like a reasonable percentage for repair and maintenance. Too often no thought is given, in advance of purchase, to the need to plan for ongoing maintenance and repair in a routine way. Thus tremendous expenditures are made in the way of renewal of supplies and equipment, while little is budgeted for their effective maintenance and repair.

Mr C.D. Christodoulides, Director of the Higher Technical Institute, Nicosia, then addressed the meeting. Attached as Annex III is his address.

After the recess the following officers were elected:

Chairman Dr A. Malloupas
Rapporteurs Dr M. Nieman and Dr A. Gaber

The Provisional Agenda was approved without amendment (Annex IV).

The Programme and List of Participants are given in Annexes V and VI.
II REVIEW OF THE EXISTING TRAINING PROGRAMME FOR TECHNICIANS IN MAINTENANCE AND REPAIR OF MEDICAL EQUIPMENT (BAHRAIN/CYPRUS/EGYPT)

Representatives from Bahrain, Cyprus and Egypt presented reviews of the existing training programmes.

III COMPARATIVE ANALYSIS OF TRAINING COURSES CONDUCTED IN CENTRES IN EMR

A comparative analysis of training courses conducted in the three centres within the WHO Eastern Mediterranean Region was presented by Dr A. Khogali, WHO Regional Adviser on Health Personnel Education (Annex VII).

IV REVIEW OF THE MAINTENANCE AND REPAIR OF MEDICAL EQUIPMENT IN SOMALIA AND YEMEN ARAB REPUBLIC

Information on the activities undertaken by the WHO Technical Officers in Somalia and Yemen Arab Republic was also presented.

V DISCUSSIONS

1. Following the presentations, the following important issues were identified:
   1. Importance of integrating training and service for programme effectiveness.
   2. Types and levels of training required.
   3. Practical training needs.
   4. Relevance of training to needs.
   5. Follow-up of trainees and feedback from services.
   7. Role of consultants.

These issues were discussed in detail and the following conclusions were reached:

(a) Staff involved in formal education and workshop training should have active commitments to providing engineering service, particularly repair and maintenance. This will ensure that relevant skills are developed and imparted to the students; it will also make the best use of scarce personnel and in cases where necessary,
generate staff incentives through service earnings. Experience has shown that close contacts with the health care system ensure the development of engineering supporting services along relevant lines.

(b) All participants agreed that an improvement in teaching effectiveness should result from Centre staff whether full-time or part-time having the opportunity to attend courses in teacher/training. Such courses should be in the form of short workshops designed to be relevant to what they teach.

2. It was agreed that all levels of technical personnel, from basic technicians to hospital engineers, are needed. The development strategy, however, should be to build from the basic level upwards, and it is essential that technical leadership by a national, in particular high level liaison with Ministry of Health, should be established from the start.

3. It was agreed by all participants that on-the-job training is of vital importance and that it should be relevant to the needs of the trainee's country. It was agreed that active service units in the Region should be used as field training resources, to implement this plan. Collaboration between the Cyprus programme and the service Centres in Egypt and Bahrain should be established.

4. A Survey is needed to review the countries' needs and resources and the efforts made by WHO during recent years in the field of repair and maintenance. One useful outcome will be the improvement of the design and implementation of future training programmes.

   In order to ensure that training is relevant to countries' needs, requests for WHO fellowships should give adequate details of the equipment the trainees will be dealing with on return home.

5. The importance of follow-up on utilization of the graduates of training programmes was stressed. Three methods of follow-up were discussed:

   - long-term evaluation performed by a senior national technical person in the Ministry of Health. This could be the most effective way since it provides continuity.
A second approach could be evaluation by a visiting WHO technical adviser familiar with these activities in the Region.
- The existing practice of "fellowships utilization reports" is considered to be the least effective.

6. Governments should recognize the value of training in repair and maintenance of hospital equipment and give it due consideration in promotion and career development.

7. The present need for short- and long-term consultants for the development of sound training programmes was recognized. Clearly, the intention should be to phase out such inputs as regional expertise develops.

VI BRIEF REVIEW OF ACTIVITIES OF EASTERN MEDITERRANEAN REGION OF WHO IN THE FIELD OF MAINTENANCE AND REPAIR OF MEDICAL EQUIPMENT

A brief review of the activities of the WHO Eastern Mediterranean Region in the field of maintenance and repair of medical equipment as presented by Dr A. Modjtabai, Regional Adviser on Cancer and Radiation Health, is given in Annex VIII.

VII SOME ALTERNATIVES ON HOW TO IMPROVE THE MAINTENANCE OF HOSPITAL EQUIPMENT IN DEVELOPING COUNTRIES

Mr P. Vogt, WHO Consultant, presented his views on how to improve the maintenance of hospital equipment in developing countries.

VIII ANALYSIS OF CONSTRAINTS IN PROGRAMME DEVELOPMENT

The following constraints were identified by the participants. Some of these are common to all existing programmes of training and they may be classified in three groups:

GROUP A

General Factors related to system

(a) Lack of administrative support including senior technical management in Ministries of Health.
(b) General lack of technical input in procurement of equipment.
(c) Lack of adequate budget for service activities.
(d) Lack of incentive schemes.
(e) Factors influencing work habits.

In discussing these factors, the following suggestions were made:

- In the proposed survey (see V.4 above), an effort should be made to identify suitable technical persons of seniority and develop them to assume the role of technical leadership in the Ministry of Health in each country. An orientation programme for such persons would be useful. It is also recommended that senior administrative Ministry of Health personnel should be invited to future meetings on maintenance and repair of medical equipment to ensure their involvement and commitment in the solution of identified problems.

- Technical persons are greatly needed to serve on high level purchasing committees. This will help to obviate many of the existing problems related to the introduction and utilization of technology. Ideally the aim should be to minimize diversity, since this will alleviate maintenance problems and hopefully ensure technical appropriateness to local needs and conditions.

- Too often inadequate budgets are allocated for all aspects of service activities. It is essential that senior Ministry of Health administrative personnel recognize the importance of this issue in effective application of technology to health care.

- Great difficulties are encountered in many countries in the Region in attracting, utilizing and retaining suitable technical personnel on account of relatively low governmental salaries. Incentive schemes (both professional and financial aspects) have been shown to work in at least one country and the development of these should be encouraged. One approach is to allow Ministry of Health maintenance units to undertake work for fees.

- Good work habits, e.g. good time-keeping, initiative, sense of responsibility, efficiency, could be created by suitable training, management and incentive schemes. During training it is important that the type of environment and activities undertaken be closely related to the defined job role in future.
GROUP B

Education and Training Aspects

- Lack of suitable candidates for training in some countries.
- Lack of homogeneity in educational levels of trainees in some programmes.
- The limited capacity of training centres.

The following conclusions were made in discussing these constraints:

- All possible sources of suitable candidates should be considered, including general technical institute graduates; selection should not be limited to general secondary school graduates. Sound propaganda, coupled with incentives can be effective in attracting sufficient numbers of the required quality.

- Selection criteria for entry to different levels of programmes should be tightened, since severe problems have arisen when the range of background and abilities is too wide. Consideration might be given to grouping trainees in the Higher Technical Institute programme in Cyprus by countries of similar needs and whose candidates are of comparable standard. Also, where English language is a barrier to training, programmes in departments of medical equipment where Arabic is used may be utilized.

- At present there are limitations in all three training centres:
  (a) At the Higher Technical Institute, Nicosia, Cyprus, more training staff and laboratory space are required on the campus. Links and access to hospital service units need to be developed much further.
  (b) At the Medical Equipment Centre, Manama, Bahrain, more space and additional staff will be required to extend present commitments.
  (c) At the Department of Medical Equipment, Cairo, Egypt, the main limitation is shortage of experienced technical personnel to supervise and run on-the-job training programmes.

It was agreed that these issues should be reviewed in greater depth following the survey of regional needs.
GROUP C

Service-related aspects

(a) Limited physical resources in some countries (e.g. transportation, workshop equipment, communications).

(b) Difficulties regarding the supply of spare parts, materials and technical information.

The following conclusions were made:

- It is important that Government authorities help the developing services in maintenance and repair of medical equipment to overcome their transportation and communication problems.

- It would be impractical to develop a central regional store for spare parts. The long-term solution is for countries to solve their own problems by reorganization of their engineering services within the Ministry of Health. Utilization of the WHO Revolving Fund Scheme or access to their direct procurement system may ease some of these problems.

IX  APPROACHES TO CURRICULUM PLANNING AND TEACHING METHODS

Presentations were given by participants from each centre about their curricula and the approaches they have adopted in the development of the programmes. This was followed by a discussion which covered many related issues and problems. The following conclusions were made:

1. Definition of the job which the technicians will be doing in their home countries should guide the process of revising the curriculum and their training. This has been attempted already to some degree in the Department of Medical Equipment, Egypt, and the Medical Equipment Centre, Bahrain, using their service experience. It was agreed that the different service units operating in the Region will provide the Higher Technical Institute, Cyprus, with an analysis of their service work.

2. For the present polyvalent course in the Higher Technical Institute, Cyprus, suitable facilities and staff for on-the-job training need to be provided. The question of utilizing other centres in the Region to share part of this load
will need to be determined on the basis of additional resources required to perform this role. It was agreed that Centres will provide this information by end October 1981.

3. The question of introducing training programmes in other countries of the Region should be kept as a long-term target. It is important for the present to consolidate and strengthen existing programmes.

X DETERMINATION OF PRIORITY NEEDS FOR INSTITUTIONAL/TRAINING PROGRAMME DEVELOPMENT IN EACH OF THE CENTRES

It was felt that much of this topic had been covered in earlier discussions and that more detailed information required to determine priorities should be available from the survey of regional needs which had been recommended (Section V.4, page 3).

It was agreed that the needs/resources survey is urgently required to guide the development of the programmes; the meeting therefore recommended the following plan of action for its implementation:

- WHO nominates a suitable technical coordinator for this work.
- The first stage of the survey will be to review all the existing technical reports including those called for at this meeting.
- The coordinator will summarize the information available to date and then prepare a draft survey document which will be circulated to participants of this meeting for comments: the focus should be on the initiation and development of service nuclei. Items which are likely to be useful in the survey include information on the following:
  (a) technical schools, colleges, etc.;
  (b) Ministry of Health service organizations, employment conditions, etc.;
  (c) numbers, type and distribution of health care facilities;
  (d) level of technology in different health facilities.

This task should be completed by early 1982.

- WHO circulates to Ministries of Health in a selected number of countries in the Region an initial survey document for collection of information. This should be accompanied with clear briefing on the purpose of the survey. This should be followed by on-site visits by suitable consultants to help in completing/reviewing the information and data available and review available resources at first hand.
- Collation and analysis of the collected information.
- The results of the survey should be available for consideration as a central theme in the next meeting of Directors/Managers of the Centres which is proposed to take place in September 1982.

XI IDENTIFICATION OF AREAS FOR FUTURE COOPERATION AMONG CENTRES AND WITH WHO

The areas for cooperation and the mechanisms to bring them about were discussed at great length and the main points are summarized below:

1. It was agreed that exchange of instructors and service personnel for specific purposes would be highly desirable and useful. These exchanges would generally be of short duration (one month maximum) and agreed between the centres involved. The support of WHO is needed to bring about and promote such exchanges. The visits may be sponsored either under the fellowship programme when the purpose is to upgrade the skills of a staff member, or under the Regional Visiting Scientist and Health Administration Programme when the visiting staff are to participate in teaching and/or advise on service development.

2. WHO may utilize the services of qualified and experienced staff in the Centres for suitable short-term consultancies as required.

3. The training centres agreed to exchange teaching/learning materials including aids upon request. WHO can help in the production and distribution of such materials on a regional basis.

4. It was agreed that information exchange on all activities of the centres and service units be encouraged at all levels. In particular, it was proposed that a regular Newsletter be established and circulated widely in the Region to promote interest in the development of engineering services activities. It was agreed that the Higher Technical Institute, Nicosia, Cyprus, should coordinate exchange of information between Centres and undertake issuing the Newsletter in collaboration with WHO EMRO. The publication of such a Newsletter will need the support of WHO.
XI RECOMMENDATIONS

1. A survey of regional needs and resources for engineering services and manpower is urgently needed. A plan for action is proposed (see section X above).
2. Staff involved in training must also be involved in service and vice-versa.
3. Short teacher/training courses for instructors are required.
4. Technical leadership by a national at Ministry of Health level needs to be established in all countries.
5. On-the-job training is essential in all programmes and at present existing service centres within the Region should be utilized for this purpose. Additional resources will need to be allocated to these service units in order to cope with the trainees.
6. Effective trainee follow-up methods need to be instituted.
7. WHO should continue to advise and encourage Member Countries to institute career structures and incentives in order to attract and retain personnel in this field and promote the development of the service.
8. The participating centres should collaborate in the following areas:
   (a) exchange of trainers;
   (b) information exchange;
   (c) exchange of teaching/learning materials.
9. A Newsletter to promote awareness about the role of engineering services in the health care system should be issued with the support of WHO.
10. As a follow-up a second meeting of the Directors and Project Managers should be held in a year's time and include participation by senior Ministry of Health administrative staff in EMRO States with responsibilities in this field.
ADDRESS BY MR C. VAKIS, DIRECTOR-GENERAL, MINISTRY OF HEALTH,
ON THE OCCASION OF THE MEETING OF DIRECTORS OF REGIONAL
TRAINING CENTRES, ORGANIZED BY WHO EMRO, 7-9 SEPTEMBER 1981

Ladies and Gentlemen,

We are honoured and pleased to host in Cyprus yet another meeting organized by
the WHO Regional Office for the Eastern Mediterranean. Honoured because of the selec-
tion of our country for the organization of the meeting and pleased because it gives
us the opportunity to welcome and meet friends and colleagues as well as enabling us
to contribute, within the limits of our resources, to the efforts made to health
development in the countries of the Region.

It may sound strange to mention health development in connection with a meeting
of Directors of Training Centres for the Repair and Maintenance of Hospital Equipment.
Because it is very unlikely that the ordinary citizen, or for that matter any citizen,
however enlightened but not directly concerned with the issue in hand, may appreciate
the extent of the contribution and the significance of hospital equipment for health
development. To appreciate, that is, that with the advance of technology and its
application to medicine, we become increasingly dependent on its products for diagnosis
and treatment and therefore for the general improvement of health conditions.

The recognition that the contribution of technological development is significant
for the improvement of health standards leads to the corollary recognition that, if
its products, (in our case hospital equipment) are to contribute substantively, effect-
ively and accurately, then, their proper functioning becomes very important. To this
effect a basic prerequisite is the availability of well-trained technicians. The
training and development of this type of personnel, for the staffing of Health Services,
we are presently pursuing in the Centres of the Region which have been established by
the WHO Regional Office with high investment and effort, thanks to the interest and
concern of the Regional Director and his staff. This training and development of
personnel in the field of the repair and maintenance of hospital equipment has become
as important as training and development of medical and paramedical personnel.

The purpose of the meeting is well known to all participants. It is intended to
bring together the leading people of the various centres established in the Region which
carry responsibility for the training of personnel for the repair and maintenance
of hospital equipment, with a view to exchanging ideas and experience and discussing and solving problems encountered in the course of their activities, but also for the purpose of planning further activities which would help to fill gaps that may exist and which may hinder the achievement of the objectives for which the centres were established.

We, in Cyprus, aspire to have our Centre developed to such a standard that it may satisfactorily meet the needs of the countries which benefit from its courses and activities, having always in mind the constant and rapid advance of technology and the concern of the countries to obtain and use the best possible hospital equipment. We are sure that the same aspiration prevails in all the countries which run parallel courses as is evidenced by their presence at this meeting. This aspiration and devotion to service will, I am sure, prevail throughout your deliberations and will influence the level of the discussion and the decisions to be reached. I hope that you will have a rewarding time, in conditions which the hosts will, I hope, try to make pleasant, and look forward to your findings and recommendations.

I take this opportunity to thank Dr Taba for his continual concern and interest in the development of all sectors connected with the improvement of health services.

Before I conclude I would also like to convey to you all a warm welcome from my Minister and my Government and to wish you all a happy stay in Cyprus and success in your efforts.
MESSAGE FROM DR A.H. TABA
DIRECTOR
WHO EASTERN MEDITERRANEAN REGION
TO THE
MEETING OF DIRECTORS OR PROJECT MANAGERS OF THREE
TRAINING CENTRES FOR MAINTENANCE AND REPAIR OF
MEDICAL EQUIPMENT IN EMR
Nicosia, 7-9 September 1981

Dear Colleagues,

It is a pleasure for me to send a message to all the participants in this important meeting.

At the outset, I would like to express my gratitude to the Government of Cyprus for hosting the meeting and for the excellent arrangements made to ensure its success. My particular thanks are addressed to Mr C. Vakis, Director-General, Ministry of Health, for honouring this opening session with his presence.

Our main aim at this meeting is to exchange views and examine the feasibility of developing a network of training institutions capable of meeting regional manpower needs in the field of maintenance and repair of medical equipment.

This is certainly a priority area in WHO's collaborative programme with Member States. It is a well-known fact that Member States spend a great proportion of their budget on the procurement of medical equipment needed for the diagnosis and treatment of disease. With the growth of the health infrastructures in order to increase health coverage and the galloping costs of sophisticated equipment, government expenditures for such purchases will continue to become greater and greater.

The Organization recognizes that this subject is one which is much wider than can be resolved by training programmes alone. As I have said before, there is, in almost all our countries, little tradition of providing either the financial or the human resources to ensure that the wisest purchases are made or that what is purchased is looked after properly, and so repaired and maintained as to be put to the most effective use.

In general, in the health planning and programming in this Region, there is only limited acceptance of what might be called the concept of maintenance. Too often
damaged or faulty equipment is either left to rust and rot, or replaced at great cost, when minimal expenditure on repair could restore it to function. Too rarely do institutions allow, in their budgets, anything like a reasonable percentage for repair and maintenance. Too often no thought is given, in advance of purchase, to the need to plan for ongoing maintenance and repair in a routine way. Thus tremendous expenditures are made in the way of renewal of supplies and equipment, while little is budgeted for their effective maintenance and repair.

It is against such a background that our collaborative efforts in training are conducted.

We are most grateful for what has been done by the Government of Cyprus, through the Ministry of Health and the Higher Technical Institute in recent years. The many fellows trained at the Regional Centre here in Nicosia, coming from a wide variety of countries of the Region, have contributed a lot, already, to ameliorate the situation. The contributions of the Abbassia Centre in Cairo, Egypt, and those of the programme of the College of Health Sciences, Bahrain, with its special focus on the needs of the Gulf countries, are well appreciated by WHO and by the countries they serve. WHO has collaborated to some degree with each. We look forward, in the context of the development of such a network as may emerge from this meeting, to further collaboration in the future.

I am sure you will all agree that, in the training area alone, a great deal remains to be done.

I am confident that your deliberations will lead to concrete recommendations for the establishment of collaborative measures among your respective institutions and WHO, in order to strengthen our regional training capability in the vital field of maintenance and repair of medical equipment, for the benefit of all countries of the Eastern Mediterranean Region.

I wish you a most successful meeting.
ANNEX III

WELCOMING MESSAGE
BY MR G.D. CHRISTODΟULIDES
DIRECTOR, HIGHER TECHNICAL INSTITUTE, NICOSIA
TO THE MEETING OF DIRECTORS AND PROJECT MANAGERS OF TRAINING
CENTRES FOR MAINTENANCE AND REPAIR OF MEDICAL EQUIPMENT IN THE
EASTERN MEDITERRANEAN REGION
(7 SEPTEMBER 1981)

On behalf of the Higher Technical Institute (HTI) and of the Staff of the Regional Training Centre of Nicosia for the WHO courses in the field of maintenance and repair of Medical and Hospital Equipment, I, too, would like to extend cordial greetings to the participants of this meeting, and to welcome them to Cyprus.

We, at the HTI are modestly proud of the fact that in the span of less than five years, we have managed to overcome the teething problems which a Training Centre of this nature, with a wide catchment regional area, and of steadily diversifying activities, would be faced with.

As you, I am sure, would know, expertise in the field of repair and maintenance of medical and hospital equipment is a scarce commodity.

In our endeavours, we have, however, been supported by the confidence shown in our institution by WHO, have been encouraged by the personal interest, the vision and the determination of Dr Taba, the WHO Regional Director, and of the other senior members of his staff and have had the assistance and guidance of WHO International Experts such as Mr Vogt and Mr Kroezen, and the genuine interest and support of the Ministry of Health.

Much has also been achieved by the cooperation we have had from the staff of the Electromechanical Services and of the Nicosia General Hospital. Finally, I would like to mention the important contribution in the organization and operation of our Training Centre made by the hard and devoted work of the Course Director, our Dr Malloupas, and of the other staff of the Institute.

In making this wide survey of the factors which have contributed to the establishment of the R.T.C., Nicosia, my aim was not only to give credit and praise where due, but also to bring into the focus of this esteemed gathering the fact that novel institutions like the ones you represent here, would of necessity depend for their
operation and success on a multiplicity of factors and on the cooperation of many, and diverse, departments.

This meeting, which has been called to identify these constituent elements and to exchange experiences, is a landmark in the development of training institutions in fields for which tradition and established procedures have, as yet, little to offer.

Your contribution will, therefore, be of vital importance to future progress and development.

In welcoming you, again, to this conference, I wish you every success in your deliberations.
Annex IV

AGENDA

1. Opening of the Meeting
2. Election of Chairman and Rapporteur
3. Adoption of the Agenda
4. Review of the Existing Training Programmes for Technicians in Maintenance and Repair of Medical Equipment
   (a) Cyprus
   (b) Bahrain
   (c) Egypt
   (d) Somalia
   (e) Yemen Arab Republic
5. Assessment of their Relevance to National/Regional Needs
6. Analysis of Constraints in Programme Development
7. Comparative Approaches to Curriculum Planning and Teaching Methods
8. Determination of Priority Needs for Institutional/Training Programme Development in each of the above Centres
9. Identification of Areas for Future Cooperation among the Centres and with WHO, in particular in respect to:
   - Exchange of Teachers within the Framework of TCDC
   - Provision of Consultants
   - Educational Development and Support
10. Summary Report and Recommendations for Collaborative Arrangements among the Centres and with WHO and other Institutions within or outside the Region
11. Closure of the Session
Monday, 7 September 1981

9.00 a.m. - 9.30 a.m.
- Opening Address by Mr C. Vakis, Director-General, Ministry of Health, Cyprus
- Message of Dr A.H. Taba, WHO Director Eastern Mediterranean Region
- Welcoming message by Mr G.D. Christodoulides, Director, Higher Technical Institute, Nicosia

9.30 a.m. - 10.00 a.m.
- Coffee break

10.00 a.m. - 1.00 p.m.
- Adoption of the Agenda
- Review of the existing training programme for technicians in maintenance and repair of medical equipment: Bahrain, Cyprus, Egypt, Somalia, Yemen Arab Republic
- "Comparative analysis of training courses conducted in centres for maintenance and repair of medical equipment within the WHO Eastern Mediterranean Region", by Dr A. Khogali, WHO Regional Adviser on Health Personnel Education.
- Assessment of relevance to National/Regional needs (Round Table discussion)
- Discussion

Tuesday, 8 September 1981

8.30 a.m. - 10.00 a.m.
- Circulation of previous day's report (Round Table discussion)
- "Brief review of activities of the Eastern Mediterranean Region of WHO in the field of maintenance and repair of medical equipment" by Dr A. Modjtabai, WHO Regional Adviser on Cancer and Radiation Health.

- Analysis of constraints in programme development.

- "Some alternatives on how to improve the maintenance of hospital equipment in developing countries" by Mr P. Vogt, WHO STC

- Coffee break

- Approaches to curriculum planning and teaching methods (Round Table discussion)

- Determination of priority needs for institutional/training programme development in each of the above centres (Round Table discussion)

- Identification of areas for future cooperation among the centres and with WHO, in particular in respect to:
  - exchange of teachers within the framework of TCDC
  - provision of consultants
  - educational development and support
  - discussion

- Circulation of previous day's report

- Summary Report and Recommendations for collaborative arrangements among the centres and with WHO and other institutions within or outside the Region
10.00 a.m. - 10.15 a.m.  - Coffee break
10.15 a.m. - 1.00 p.m.  - Above cont'd - Discussion
- Closing Session
ANNEX VI

LIST OF PARTICIPANTS

BAHRAIN

Mr M. Nieman
Head of Department
Medical Equipment Centre
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Nicosia

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Lecturer
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EGYPT

Dr Ahmed Gaber
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Medical Equipment Centre
Abbassia
Cairo

Dr David Porter
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Medical Equipment Centre
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Cairo

SOMALIA

Mr Allan G. Bass
WHO Technical Officer
Mogadishu
YEMEN ARAB REPUBLIC

Mr. T. Heininen
WHO Technical Officer
Sana'a

SECRETARIAT

Dr. A. Modjtabai
Regional Adviser on Cancer and Radiation Health and Secretary
WHO Eastern Mediterranean Regional Office

Dr. A. Khogali
Regional Adviser, Health Personnel Education
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Mr. P. Vogt
WHO Consultant
Chief, Maintenance Department, Zieglerspital, Bern.

Mrs. C. Cartoudis-Démétrio
Conference Officer
WHO Eastern Mediterranean Regional Office
ANNEX VII

COMPARATIVE ANALYSIS OF TRAINING COURSES CONDUCTED IN CENTRES FOR MAINTENANCE AND REPAIR OF MEDICAL EQUIPMENT WITHIN THE WHO EASTERN MEDITERRANEAN REGION

(based on replies to questionnaires sent by WHO to national authorities in Bahrain, Cyprus and Egypt)

1. The Centres will in this analysis be referred to as follows:

- The Medical Equipment Centre, Bahrain: MEC Bahrain
- The Higher Technical Institute, Cyprus: HTI Cyprus
- The Department of Medical Equipment, Abbassia, Cairo: DME Egypt

2. The overall objectives of the three centres are very similar:

- MEC Bahrain: to maintain medical equipment belonging to the Ministry of Health and to train nationals of the country and of other Arab States in maintenance and repair of such equipment.
- HTI Cyprus: to train technicians to be attached to hospital workshops for maintenance and repair of medical equipment.
- DME Egypt: to develop manpower and service activities in the field of maintenance and repair of medical equipment.

3. There is a great variety between the Centres as regards the courses currently offered or planned to be offered as well as in the admission requirements and duration of the courses.
<table>
<thead>
<tr>
<th>CURRENT (admission requirements)</th>
<th>Duration (award)</th>
<th>PLANNED (admission requirements)</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>- MEC Bahrain:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associate degree course</td>
<td>2 1/2 years including CHS first year &quot;core&quot; courses</td>
<td>Short &quot;in-service&quot; courses on special equipment</td>
<td></td>
</tr>
<tr>
<td>(high school leaving certificate; College of Health Sciences (CHS) entrance examination (English, Arabic, Aptitude)</td>
<td>(degree)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vocational courses</td>
<td>1 year including intensive English during first term</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(no formal entry qualifications; practical experience required)</td>
<td>(certificate)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- HTI Cyprus:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polyvalent technician course</td>
<td>9 months (certificate)</td>
<td>Specialized technician (laboratory) course (technical school certificate; entrance examination or polyvalent graduation)</td>
<td></td>
</tr>
<tr>
<td>(secondary technical school certificate; practical experience; entrance examination in English and technology)</td>
<td></td>
<td>Specialized technician (electro-medical equipment) course</td>
<td>(as above)</td>
</tr>
<tr>
<td>Specialized technician (X-ray) course</td>
<td>6 months (certificate)</td>
<td>Specialized technician (dental equipment) course</td>
<td>(as above)</td>
</tr>
<tr>
<td>(technical school certificate, five years experience; entrance examination or polyvalent graduation)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specialized technician (operating theatre)</td>
<td>2 months (certificate)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(as above)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CURRENT (admission requirements)</td>
<td>PLANNED (admission requirements)</td>
<td>Duration</td>
<td></td>
</tr>
<tr>
<td>---------------------------------</td>
<td>----------------------------------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td><strong>DME Egypt</strong> Bio-medical equipment technician course (BMET) (technical vocational school graduation specialized in electricity)</td>
<td>**Advanced electronics course (1982)&quot; in-service&quot; for technicians and engineers)</td>
<td>2 years</td>
<td></td>
</tr>
<tr>
<td>Basic-technician refresher course (technicians employed by Ministry of Health)</td>
<td>Sterilization technology course (1982) (&quot;in-service&quot; for operators (part I) and engineers (part 2)</td>
<td>3 months</td>
<td></td>
</tr>
<tr>
<td>Technician-engineer training programme (graduates from university engineering faculties—new MOH staff and MOH staff development)</td>
<td>Ventilation, air conditioning and refrigeration courses (1982) (&quot;in-service&quot; for technicians)</td>
<td>6-8 months 1 month 2 months 3 months</td>
<td></td>
</tr>
</tbody>
</table>
4. The teaching language at all courses in MEC Bahrain and HTI Cyprus is English. The courses at DME Egypt are conducted in Arabic (technical terms in English) except for the Technician-engineer training programme and the Advanced electronics course which are given (or will be given) in the English language.

5. The capacity for students' admission is as follows:

<table>
<thead>
<tr>
<th>MEC Bahrain</th>
<th>Planned courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current courses</td>
<td>No.</td>
</tr>
<tr>
<td>Associate degree course</td>
<td>10</td>
</tr>
<tr>
<td>Vocational course</td>
<td>6</td>
</tr>
<tr>
<td>HTI Cyprus</td>
<td></td>
</tr>
<tr>
<td>Polyvalent technician course</td>
<td>10-12</td>
</tr>
<tr>
<td>Specialized technician (X-ray) course</td>
<td>10-12</td>
</tr>
<tr>
<td>Specialized technician (operating theatre) course</td>
<td>10-12</td>
</tr>
<tr>
<td>DME Egypt</td>
<td></td>
</tr>
<tr>
<td>Biomedical equipment technician course</td>
<td>30</td>
</tr>
<tr>
<td>Basic technician refresher course</td>
<td>15</td>
</tr>
<tr>
<td>Technician-engineer training programme</td>
<td>20</td>
</tr>
</tbody>
</table>

6. There seems to be an overall common trend in the relative importance given to theoretical and practical training. For the higher-level basic training courses more time is spent on instructions in theory than on practical work while the opposite is the case for some of the courses designed for lower-level technicians. In the case of specialization or training of academically qualified staff, the educational approach is rather one of "self-direction" under supervision, and with a great deal of practice involved.

7. The organizational structure of the three centres differs widely as could be expected. MEC Bahrain is a Department of a central hospital complex, the Salmanyia Medical Centre, and comes, as such, under the administrative control of the Ministry of Health. It complies with the rules and regulations of the College of Health Sciences which provides all teaching during the first year (CHS first year "core"
courses) of the Associate degree course and teaching in English and Mathematics during
the second year. CHS awards the Associate Degree. MEC Bahrain is directed by a Head
of Centre assisted by three Associate Heads and has four departments (electronics
general), electronics (laboratory and ultrasound equipment), X-Ray and mechanical.
Lectures are provided by the Head of the Centre and his Associates as well as by three
electronic engineers, one mechanical engineer and one X-ray engineer who are responsible
for the four departments and whose main functions are the maintenance and repair of
medical equipment in the Salmanyia Medical Centre, two maternity hospitals and twelve
health centres. A number of technicians assist in the practical part of the courses.

HTI Cyprus, established with the assistance of UNDP, ILO and UNESCO, has the over-
all technical and administrative responsibility for organizing and conducting, in col-
laboration with the World Health Organization, courses on maintenance and repair of
medical equipment. HTI operates under the Ministry of Labour and Social Insurance and
its director is himself manager of these courses, assisted by a course supervisor.
In all, fourteen lecturers, four workshop instructors, two laboratory assistants and
administrative staff are assigned to the courses, some on a full-time basis, some
part-time only. A few consultants (including two WHO short-term consultants) provide
support to the organization and conduct of the courses.

DME Egypt operates under the authority of the Ministry of Health (Under-Secretary
for Manpower Development) and in connection with the conduct of the Biomedical equipment
technician course the Department is viewed as a branch of the Imbaba Health Technical
Institute in Cairo. The diploma awarded on graduation from this course is approved
and monitored by the Ministry of Education. The overall policy and management of the
Department is controlled by a committee having high-level membership from various
governmental departments while its day-to-day management is the responsibility of a
director assisted by a deputy, the latter being appointed for six months among the
technician-engineer staff of the MOH Department of Medical Equipment (DME) on a rota-
tional basis. There are four functional units each headed by a manager (technician-
engineer): education and training; DME development work and projects; service activ-
ities undertaken from headquarters; and hospital-based satellite activities. The
training activities of DME Egypt and its hospital-based satellites are controlled by
a director assisted by an administrative supervisor. There are eighteen technician-
engineers (1982:24) engaged in teaching at the courses together with three visiting
lecturers (1983:1). The administrative staff comes to 5 (1982:7) and six staff
members (1982:10) provide technical support for laboratories and workshops (excluding staff in satellite units). Consultants (2 full-time) are made available by the UK Overseas Development Administration and by WHO. A number of hospital-based satellites (in Cairo) and regional (Giza, Suez Canal, Upper and Lower Egypt) centres for maintenance and repair of medical equipment will be established over the next few years. These centres will, in addition to providing services to hospitals and health centres, be available for undertaking biomedical equipment technician training programmes, should such local training prove to be desirable.
ANNEX VIII

BRIEF REVIEW OF ACTIVITIES OF THE EASTERN MEDITERRANEAN REGION OF WHO IN THE FIELD OF MAINTENANCE AND REPAIR OF MEDICAL EQUIPMENT

by

Dr A. Modjtabai*

Member States in WHO's Eastern Mediterranean Region (EMR) committed to the social goal of "Health for All by the Year 2000" are in the process of developing and expanding their health infrastructures in order to increase health coverage and gradually provide essential health services to the entire population.

No health care delivery system, however, can meet the health needs of the population without utilizing medical equipment indispensable for the diagnosis and treatment of diseases. The lack of adequate maintenance and scarcity of personnel or facilities for the repair of such equipment result in considerable wastage of investments made for its procurement and seriously diminish the effectiveness of both preventive and curative health services. Therefore, the maintenance and repair of medical equipment has been recognized as one of the priorities of the WHO regional programme in the EMR. WHO activities in this field focus on:

- collaborating with Member States in formulating appropriate policies, taking into consideration countries' needs and resources; such policies should include the establishment of adequate budgetary provisions, not only for the procurement of equipment but also for spare parts needed for repair;

- increasing the regional training capability of various categories of technicians in the field of maintenance and repair of medical equipment through the development of a regional network of training centres;

- direct support to Member States for the development of maintenance and repair of medical equipment services through the provision of advisory services, assignment of permanent staff, and the supply of suitable and reliable equipment as well as spare parts;

- at the country level emphasis is given to the development of national training programmes adapted to local needs and resources and the development and/or establishment of workshops.

*WHO Regional Adviser on Cancer and Radiation Health
Certainly Mr Vogt in presenting his paper on "Some Alternatives on how to improve the Maintenance of Hospital Equipment in Developing Countries" will review the major problems which countries are facing today and the approaches to be followed in order to improve the situation.

I will only take a few minutes to review the concrete steps undertaken by the WHO Eastern Mediterranean Region in recent years in the field of maintenance and repair of medical equipment:

1. Establishment of the Regional Training Centre for maintenance and repair of medical equipment in Cyprus at the Higher Technical Institute, Nicosia. Forty-two students from Eastern Mediterranean countries have completed the First, Second and Third Polyvalent Technicians Course (1979-1981). In addition, twenty students from countries of the Region have also completed the six-month X-ray specialized course and the two-month operating theatre equipment course.

At the present time twelve students are participating in the Fourth Polyvalent Technicians Course (September 1981-June 1982).

2. Financial and technical support has been given to the Abbassia Centre, Cairo, which has not only trained a considerable number of Egyptian students, but also students from other countries, for instance, Sudan.

A training manual in Arabic for technicians at intermediate level is being prepared and the Centre is also planning to train biomedical engineers.

3. The College of Health Sciences, Bahrain, runs courses at associate degree level which are of great use to other Gulf countries. WHO is collaborating also with this Institution.

4. Fourteen fellowships have been awarded to teachers from various regional countries to study in institutions outside the Eastern Mediterranean Region in, for example, France, United Kingdom, Netherlands, Federal Republic of Germany and Switzerland.

5. Ad hoc services of consultant engineers have been provided to several countries such as Bahrain, Cyprus, Democratic Yemen, Iran, Iraq, Pakistan, Saudi Arabia, Somalia, Sudan, Syria, Tunisia and Yemen Arab Republic, for situation analysis, organization of workshops, preparation of lists of spare parts and tools, and establishment of distribution systems for spare parts. Their twenty-five assignment reports constitute the basis for future planning.
Since 1978, $2,300,000 have been allocated by EMRO to 12 country projects (Afghanistan, Cyprus, Democratic Yemen, Egypt, Iraq, Jordan, Oman, Pakistan, Somalia, Sudan, Syria and Yemen Arab Republic), which included $440,000 for fellowships and $900,000 for the supply of spare parts and medical equipment.

The WHO Eastern Mediterranean Region will continue its collaboration with Member States in order to achieve the ultimate aim which is their self-sufficiency in developing maintenance and repair of medical equipment services.

Appropriately trained technicians of all categories constitute a "condition sine qua non" for attaining this goal. The task ahead is not an easy one. It requires:

- identifying training needs for each category of essential technicians;
- developing relevant training programmes for each of the above categories;
- cooperation, in the spirit of Technical Cooperation among Developing Countries (TCDC), among the training institutions of different countries and mobilization of resources for implementing their programmes;

and last but not least,

- increasing the planning and management capability of countries to ensure that the personnel trained will have the tools needed to perform their task and will be rationally utilized.