Continuous Training in Biomedical Engineering: Necessities, Effects and Possibilities

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Abstract. **- Establishing optimal conditions for providing qualitative, safe and efficient medical devices for a health system, guarantees quality of the medical service, protection and promotion of population' health through equitable access to advanced medical services which is one of the main priorities of a health system.**

In order to solve these problems it is necessary to establish a viable system with continuous improvement, mandatory for professionals who cater medical devices. There are several options to develop skills and each institution should pursue a combination of strategies to ensure an appropriate training. A skill development program is vital.

Index Terms **— medical devices; training.**

I. INTRODUCTION

Healthcare industry with a turnover more than 100 billion dollars annually and with a growth rate of 7% per year: it is one of the few areas that is expected to grow continuously for a long time. Healthcare industry includes 13,600 registered producers, about 10,000 generic devices and over 500,000 products. About 50% of all treatment and diagnostic methods used today did not exist 10 years ago.

Maintenance, control and health technology management have become priorities of a health policy in many countries. Many studies proved that using coherent policies in these areas can improve the cost/efficiency use of advanced medical technologies, increase patient's safety as well as the quality of medical service [1-2].

II. CURRENT SITUATION

Thus, in a report published on the website of the World Health Organization shows that despite billions of dollars spent annually on medical equipment and devices, most countries still consider medical device management as a matter of purchase and less as a part of public health policy [3]. More than 95% of medical technologies in developing countries are imported; many of them do not correspond to real needs of the national health system. It was estimated that in developing countries about 50% of medical equipment is not functional, is not used correctly and moreover the equipment is inconstantly maintained - a situation with serious consequences for patient' care. It is therefore crucial to have a national policy regarding management of medical devices including its: maintenance, inspection and proper use, specialists' training, establishing a system of continuous training.

In Moldova, the situation is similar to other developing countries, although it invests heavily in medical technology. However the maintenance and inspection of medical devices is not ensured, there is no training for specialists in the field and as well the system lacks of a proper training system.

Currently, the health system in Moldova includes 939 hospitals, of which 244 public health facilities (86 hospitals with 22,031 beds, 12,914 doctors and 27,445 healthcare workers with secondary education. Over 300 enterprises and companies dealing with import and installation of equipment and over 35 biomedical companies and service companies licensed in catering medical technology. Currently, Moldova is in lack of specialists in the field of biomedical systems and equipment, as specialists in this area were not prepared.

Amongst major problems and difficulties of health technology management in Moldova, the following can be mentioned:

- Acute lack of specialists in the field of maintenance, inspection and diagnostic of biomedical devices;
- Absence of coherent policies for activities in this area, including conformity assessment and preventive & corrective maintenance;
- Wrong management - or more specifically, a lack of established policies and procedures for planning, acquisition and maintenance of medical equipment;
- Weak or even absent technical competences in all hospitals for inspection/maintenance of medical devices, and where the competence is present it is insufficiently used;
- Lack of continuous regulation, mandatory for professionals working in the field of catering medical devices, as well as for those who are working with marketing and installing medical devices;
- Service providers are expensive and often delayed.

Causes of failures and accidents of medical equipment can be classified as:

10% - Technical failure;
30% - Inadequate maintenance strategy;
60% - User mistakes.

A proper implementation of health technology management allows 80% of maintenance issues to be resolved by 20% of resources.

III. CONTINUOUS TRAINING IN BIOMEDICAL ENGINEERING

In order to solve these problems it is necessary to establish a viable system with continuous improvement, mandatory for professionals who cater medical devices.

Training' beneficiaries can be divided into following groups:

- Users of medical devices;
- Bioengineers and technicians, who serve medical devices;
- Administrative staff.

Trainings can be classified as:

• Basic Training - this should be enough to get fundamental knowledge regarding the basics of electricity, mechanics, optics, pneumatics as well working material features;

• Training in the working place - it should address the staff to the specific needs of medical technology, working in the health service, HTM activities such as: accounting, stock control and inventory renewal. This training may be provided by central or regional HTM teams;

• Introductory Training – when the staff is freshly employed, transferred to another department, institution or another location with other responsibilities;

• Training when new equipment is brought;

• Recover training- to renew skills;

• Skills development - participation in training courses focused in vocational training institutions.

Trainings for equipment operators must include:

• Practice using the equipment;

• How to operate the equipment;

• Proper application of the equipment;

• Safety procedures;

• Inventory and stock management;

• Planning the preventive maintenance for users;

Training curricula for users includes the following presentations:

• Health Technology Management;

• General principles;

• The organizational structure of health technology management with assigning obligations and responsibilities to each level;

• Assess efficiency of HTM;

• Documentation and reporting

• Electrical safety of medical devices, patient' and health worker security;

• Practical sessions: working with defibrillator and pulse oximeter;

• Final evaluation, course evaluation.

It should be mentioned that if pre-assessment was 45.7% then the final evaluation was 77.6%.

Provision of such trainings should be taken into consideration seriously by the medical facilities. There are several options to develop skills and each institution should pursue a combination of strategies to ensure appropriate training. A skill development program is vital. Staff necessities during training, no matter which level, should be inscribed in a training plan.

CONCLUSIONS

Medical institutions can provide a complete service that is not impeded by non-functional technologies. Equipment is used and maintained correctly henceforth the staff uses the equipment, following written procedures and good practice.

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