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METROLOGICAL SUPPORT SYSTEM IN THE FIELD OF HEALTH CARE OF THE REPUBLIC OF UZBEKISTAN

Vohobjon Nishonov,
Specialist
Uzbek National Institute of Metrology,
Independent researcher (PhD),
Tashkent State Technical University
Tashkent, Uzbekistan
Najmiddin Muminov
Doctor of technical sciences, Professor
Tashkent State Agrarian University
Tashkent, Uzbekistan

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Abstract:
The article describes the current state of the legal, organizational, technical and scientific base of metrological support in the field of healthcare in Uzbekistan and the problems that need to be solved.

Keywords: Metrology, metrological support, uniformity of measurements, medical measuring devices.

1.INTRODUCTION

It is known that the norms and rules of disease prevention, diagnosis and treatment in the field of health care are one of the most important areas that require high precision and are directly impacted to human health.

Today, more than 90% of diagnoses and treatments made by medical professionals are based on the results of analysis using medical technical measurements and tests, the remaining 10% are based on human sensory organs and methods of inquiry speaking.

Therefore, along with all the tools used in medicine, every technical measuring and testing equipment, from simple thermometers, tonometers, scales, designed for ultrasound examination, computed tomography, radiography, as well as the most complex and modern medical equipment used in diagnostic and treatment systems strictly comply with the specified technical parameters.

At the same time, one of the urgent problems and tasks is to ensure the stable and smooth operation of specialized diagnostic and treatment equipment, to maintain the primary technical quality provided by companies and firms that manufacture these technical measuring and testing devices.

2.MATERIAL AND RESEARCH METHODS

We noted above that the accuracy of diagnoses made to patients and the effectiveness of the methods used for treatment are directly related to the level of test accuracy and reliability and quality of medical equipment. For this reason, the metrological supply system of medical equipment plays an important role in modern healthcare today.

Legal norms in the field of ensuring uniformity of measurements in the Republic of Uzbekistan aimed at protecting the rights and legitimate interests of citizens, society and the state are regulated by the Law of the Republic of Uzbekistan "On Metrology".

The new, the revised Law of the Republic of Uzbekistan "On Metrology" was developed in order to comply the legislation with the requirements of international documents in the field of metrology and to harmonize the norms of the law with international requirements, in particular, D1 "Elements for a Law on Metrology" (III chapter) international document of the International Organization of Legal Metrology (OIML) and Interstate Documents, which are the basis for ensuring the uniformity of measurement, and was approved by the Senate of the Oliy Majlis on April 7, 2020 [1].

In order to ensure the level of accuracy and reliability of functional research related to the activities of analytical testing laboratories and metrological testing and measurement centers and to improve the quality of measurements, to develop metrological support as well as to improve the efficiency and safety of medical services provided to the population by medical organizations on the basis of improving the system of maintenance and testing of medical devices, the Decree of the Cabinet of Ministers of the Republic of Uzbekistan dated February 15, 2018 No 112 "On measures to improve the metrological control of laboratory and diagnostic equipment used in medicine" was adopted [2].

At the same time, in cooperation with the Uzbek Agency for Standardization, Metrology and Certification and the Ministry of Health of the Republic of Uzbekistan, a list of measuring and testing devices that are designed for

medicine and subject to metrological control has been developed and registered by the Ministry of Justice of the Republic of Uzbekistan on August 22, 2017 under No. 2916 [3].

The above-mentioned laws and regulations are the legal and organizational documents that are the basis for

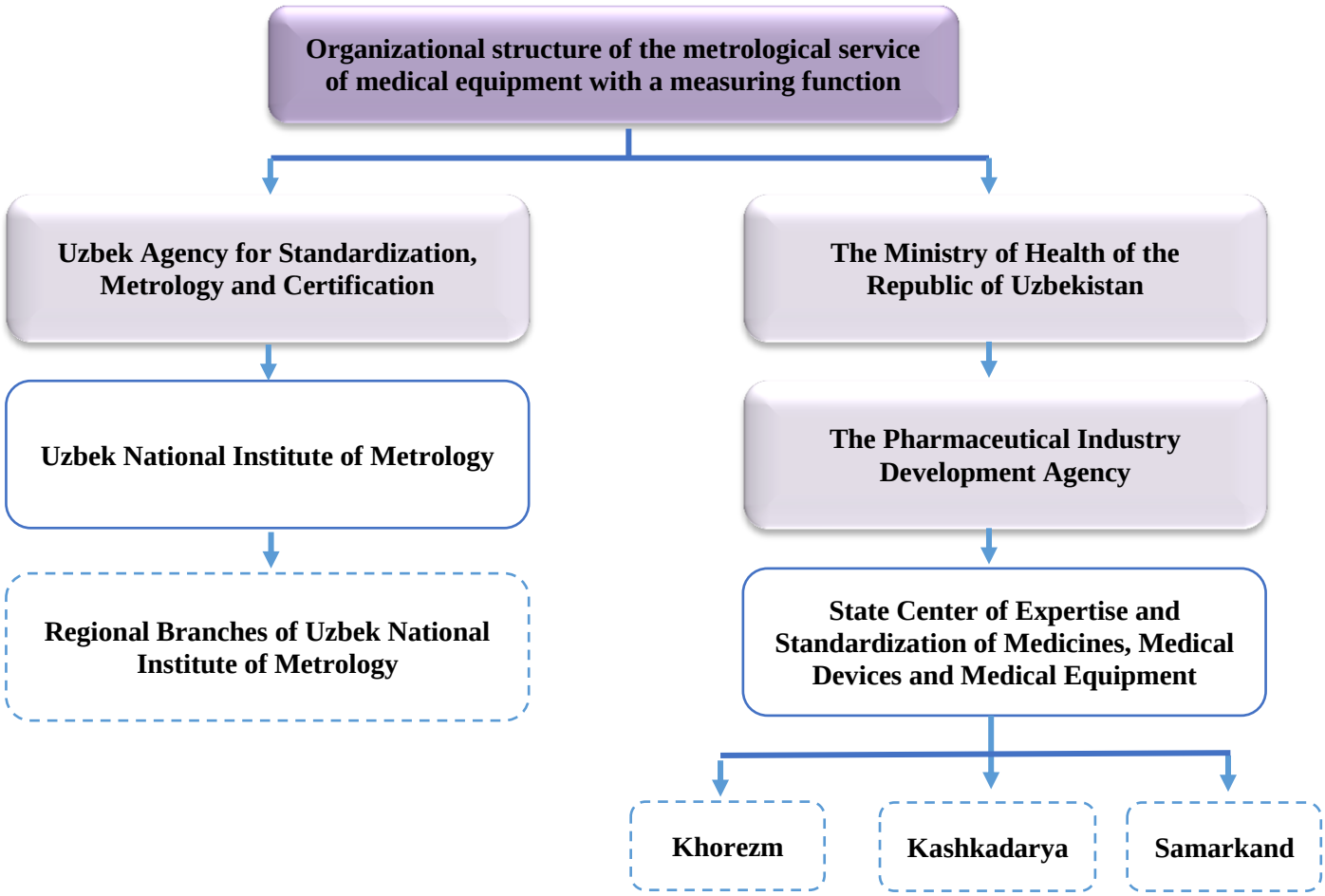

Figure 1. Organizational structure of the metrological service of medical measurement devices

the metrological control of measuring and testing devices for medicine as well as the organizing the metrological service.

According to these laws and regulations, the organizational structure of the metrological service of medical equipment with measuring functions in the Republic of Uzbekistan today is shown in Figure 1 [4].

Regular verification of measurement devices in medical organizations is a factor that determines the guarantee of the quality of medical services provided by healthcare organizations. An important stipulation for the licensing of a medical organization is an agreed list of used measurement devices, the availability of timetables for their verification and their timely implementation, the appointment of responsible persons for the metrological support of medical organizations.

Another important aspect of the problem is that the number of medical and diagnostic institutions in the Republic of Uzbekistan in **2017** was **4,000**, and by the end of **2019** the number of medical and diagnostic institutions exceeded **5,300** [5].

In order to fully cover the metrological support of these medical and diagnostic institutions, the State Enterprise "Uzbek National Institute of Metrology" is introducing a comprehensive approach to ensure uniformity of measurement of medical devices with a measuring function, including verification, metrological attestation, and information, transport services, laboratory research.

To do this, first of all, high-precision reference measurement devices were purchased and the scope of accreditation was significantly expanded. For example, currently verification and metrological attestation services are provided for the ultra-high frequency therapeutic devices, rheographs, electromyographs, ECG-holters, electroencephalographs and ultrasound diagnostic equipment.

Furthermore, the leading specialists of the State Enterprise "Uzbek National Institute of Metrology" have developed state standards of the Republic of Uzbekistan for the effective organization of metrological control of several types of medical devices.

In particular, O'z DSt 8.085:2019 "Medical systems with ultrasound diagnostic exoimpulse scanning Doppler function. Methods and means of verification", O'zDSt 8.086:2019 "Electrocardiographs, electrocardio-scoops and electrocardioanalyzers. Methods and means of verification", O'z DSt 8.087:2020 "Patient monitors. Methods and means of verification" state standards were developed.

3.RESEARCH RESULTS

Analyzing the current state of the legal, organizational, technical and scientific basis of the 4 founders of the metrological support in the health system of the Republic of Uzbekistan and the problems awaiting solution, we can come to the following conclusions:

On the legal basis, as noted above, a sufficient legal framework for the organization of metrological services in the medicine in the Republic has been developed and put into practice.

On an organizational basis, the link between medical organizations and the metrological support service has been severed. Today, as a result of the lack of a engineer-metrologist in medical institutions, metrological control of medical measuring instruments is not fully provided, or the measures to be taken for their verification and calibration are carried out later than planned.

In some diagnostic and treatment organizations, the importance of testing and measuring instruments and equipment in the process of medical diagnosis is neglected.

Based on these considerations, we consider it expedient to implement the position of engineer-metrologist in medical organizations and their regional associations.

In particular, in accordance with the Decree of the President of the Republic of Uzbekistan dated June 12, 2020 No DP-4749, it's scheduled to admit **850** full-time and **200** part-time bachelors and **50** master's students to the "Metrology, Standardization and Product Quality Management" specialty of 16 Higher Educational Institutions in the 2020/2021 academic year [6]. Apparently, we have enough opportunities for that.

On a technical basis, it is worth to note that there is a lack of high-precision measurement devices in metrological organizations that perform metrological control of medical measurement devices.

In addition, nowadays medical measurements in medical-diagnostic institutions are carried out by medical personnel (doctors and nurses) who do not have a technically adequate level of training. Therefore, there is a high demand for medical devices based on direct measurements, the results of which are graded in units of physical quantities that provide medical information [7].

On the scientific and methodological basis, there is a lack of work related to the organization and implementation of functional theoretical and practical research on the activities of the analytical laboratory, as well as the application of innovative technologies, modern scientific achievements.

There is also a need in the metrological supply system, which to develop training programs based on international requirements and experience to improve the skills of specialists working in the field of maintenance and metrological control of testing and measurement devices used in medical organizations.

4.CONCLUSION

In conclusion, it can be said that the effectively establishment of a system of metrological support of medical measurement devices prevents possible errors in the use of medical equipment and achieves high accuracy of measurement devices.

Achieving this goal, of course, requires continuous improvement of the system of integrated measures related to the legal, organizational, technical and scientific basis of the metrological supply system. Namely, it requires the training of researchers and the implementation of scientific and innovative projects. This, in turn, serves to continuously improve the quality of diagnoses and treatments given to patients and to ensure human health and well-being, which is a unique product of nature.

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