

**THE CURRENT STATE OF THE REPUBLIC AND THE METROLOGICAL
SUPPORT OF MEDICAL TECHNOLOGIES IN THE HEALTHCARE SYSTEM**

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Abstract. It is necessary to ensure the stable and proper functioning of specialized medical equipment, maintaining the primary quality provided by its manufacturers. After all, the accuracy of the diagnosis and, based on it, the effectiveness of the prescribed treatment methods depend on the accuracy of its indicators. Precisely for this reason, the issues of metrological maintenance of medical equipment are becoming increasingly relevant in the world today. This article covers the issues of metrological support of medical technologies in accordance with the requirements of the World Health Organization (WHO). In particular, opinions on the metrological renewal of equipment, its compliance with international standards, and the current situation in Uzbekistan are presented.

Keywords: Metrological support, MOZM, surgical equipment, WHO, healthcare, standard, calibration, maintenance, updating, metrological control.

Introduction

Medicine is a field that requires maximum accuracy. Therefore, all medical equipment, from simple thermometers, tonometers, scales, to devices for ultrasound examination, computed tomography, and radiography, must strictly comply with certain technical parameters. For example, the activities of the International Organization for Regulatory Metrology (IOM) are aimed at developing general issues of regulatory metrology, establishing accuracy classes of measuring instruments, ensuring the uniformity of types and samples of measuring instruments, their verification, etc. In addition, other regulatory documents have been adopted in this area, according to which the quality, technical, and other indicators of medical equipment are determined.

Methodology. Every medical technology and equipment used in modern medicine is vital to life. Their accuracy, reliability, and stable operation directly affect the patient's life. In the global health standards established by the WHO, special emphasis is placed on the metrologically correct adjustment of medical equipment. Therefore, the need for regular metrological control and updating of medical equipment, especially surgical equipment, is a pressing issue.

To ensure reliable and uninterrupted operation of medical equipment, it is necessary to carry out regular maintenance. These types of services include preventive inspections, scheduled maintenance, operational diagnostics, metrological calibration, and technical adjustment. Depending on the design features of each type of medical device, the methods and frequency of maintenance differ.

Types of technical maintenance of medical equipment.

Scheduled maintenance: This type of service is provided at specified time intervals, even if there is no malfunction. This includes assessing the overall condition of medical devices, cleaning mechanical parts, and checking sensors and detectors. For UZI devices, the condition of the monitor, probes, transducers, and signal cables is checked during this process.

Corrective Maintenance (Corrective Maintenance): Conducted due to detected malfunctions or functional deviations in medical devices. For example, if the UZI device does not display an

image on the screen or the signals are distorted, this type of service is used. In this case, technical specialists will thoroughly inspect the device and repair or replace the necessary parts. Metrological calibration: To ensure the accuracy of the measurement parameters of medical devices, calibration is carried out inevitably. In this process, the equipment is checked using special reference devices, and the results are adjusted in accordance with industry standards. The role of metrological support in the healthcare system. WHO identifies metrological compliance as one of the main factors in ensuring the safety and quality of medical equipment. According to WHO documents, each medical device:

- Calibration before use;
- Periodic inspection during operation;
- Accuracy must comply with international measurement standards.

For example, the WHO's 2011 document "Medical Device Technical Series" states that instruments that have lost or are not adjusted pose a serious health risk and lead to incorrect decisions in surgical procedures.

Metrological characteristics of operating equipment. The most common and widespread types of operating equipment include:

- Operational stellar,
- Laparoscopic devices,
- Anesthesia machines,
- Operating lamps,
- Endoscopic devices.

Most of this equipment has a complex technical structure, and each of its components must comply with certain metrological standards. Each medical device:

- Accurate measurement of temperature, pressure, electric current or voltage;
- The values displayed on the display must be close to reality;
- It is necessary to be able to diagnose oneself.

Result and discussion

During the service life of medical equipment, the WHO systematically:

- Calibration;
- Diagnostics;
- Maintenance;
- Recommends the replacement of nuclear components.

If the equipment does not meet WHO or ISO standards, it must be decommissioned or upgraded. The quality of modern medical services depends on constant innovation, which increases the need for renewal.

The Ministry of Health of the Republic of Uzbekistan has introduced regulatory documents for monitoring the metrological condition of medical equipment. However, in some regions:

- Insufficient calibration laboratories;
- Outdated equipment is in use;
- Metrological services are not provided continuously and systematically.

This causes problems in the formation of a healthcare system that fully meets the requirements of the WHO.

Conclusion

Regular verification of medical equipment in medical institutions is a factor determining the quality of medical services provided by healthcare institutions. An important condition for licensing a medical institution is the presence of an agreed list of measuring instruments used, verification tables for them, and their timely execution, as well as the appointment of persons responsible for the metrological support of medical institutions. Metrological support of

medical equipment is a vital necessity according to WHO standards. Equipment with impaired measurement accuracy, poor calibration, or obsolescence negatively affects the quality of healthcare and patient safety. Therefore:

- Improvement of the metrological control system;
- Ensuring compliance with international standards;
- The introduction of innovations is an integral part of reforms in the field of medicine.

References

1. Ministry of Health of the Republic of Uzbekistan. Technical regulations for medical equipment, 2023.
2. S. Umarov, E. Bozorov, O. Jabborova. Medical equipment and new medical technology. Study Guide. Tashkent 2018. - 216 p.
3. Uzbek Agency for Standardization, Metrology and Certification, UZ Resolution of the Ministry of Health of the Republic of Uzbekistan. Tashkent-2017
4. Otabek Shavkatov. "IMPROVING THE METROLOGICAL ACCURACY OF THE MEDICAL EQUIPMENT ECG USING AN ECG SIMULATOR." Journal of new century innovations 24.3 (2023): 59-64.
5. World Health Organization (WHO). Medical Devices: Managing the Mismatch. WHO Press.
6. WHO Medical Device Technical Series. Calibration of Medical Equipment.
7. Islomiy, Normatov, Isroilov Asadbek, and Otabek Shavkatov. "ENSURING THE QUALITY AND SAFETY OF AGRICULTURAL PRODUCTS BASED ON INTERNATIONAL STANDARDS." Next Scientists Conferences. 2022.
8. Joseph D. Bronzino, "Management of Medical Technology: A Primer for Clinical Engineers," Butterworth-Heinemann, 2014, 464p.
9. Kazimbek ugli, Shavkatov Otabek. "TECHNOLOGIES OF USING SILK FIBER WASTE IN THE PRODUCTION OF THREADS USED IN BIOMEDICINE." Web of Medicine: Journal of Medicine, Practice and Nursing 3.2 (2025): 468-471.