MONITORING SYSTEMS OF MEDICAL PORTABLE REFRIGERATOR FOR BLOOD AND VACCINE TRANSPORTATION

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The availability of certified medical equipment in the conditions of the pandemic, military operations and blackouts in Ukraine is an urgent task. Vaccines are very sensitive biological products that must be stored in appropriate conditions. For example, if a vaccine has lost its activity due to high or low temperature, sunlight, moderate humidity, freezing, etc., it may not be restored. The transportation of donor blood also requires compliance with the temperature mode.

Household refrigeration equipment should not be used for transportation and storage of donated blood and vaccines. In this case, temperature conditions may be violated, which leads to a loss of quality of temperature-sensitive cargo. Equipment to ensure compliance with the requirements of the Cold Chain. According to the regulatory and legislative framework of Ukraine, in particular the Technical Regulations on Medical Devices, IIa special class of medical equipment must be used for in vitro diagnostics. In such a case, medical portable refrigerators are compact refrigerators designed to store medicines, vaccines and blood at the appropriate temperature when they need to be transported or stored in places without access to standard refrigeration [1].

Medical portable refrigerators are required to provide an internal temperature range of +2 to +8°C and must operate at ambient temperatures of 10 ^{0}C to 43 ^{0}C. The internal surface must be covered with a material that provides for disinfection, i.e., it must be accessible for cleaning and resistant to strong disinfectants. In addition, an internal temperature control system is required; battery backup power to ensure that the refrigerator remains functional even in the case of a power outage; pre-set alarms for 1,5 ^{0}C and 5,5 ^{0}C; and air cooling must be provided by a fan. An important criterion for ensuring the required storage and transportation conditions is an automatic monitoring system. This includes remote monitoring, real-time alerts, data logging, calibration and maintenance notifications. In addition, medicines are sensitive to a certain level of humidity. This parameter also needs control in the monitoring system. It is necessary to store and transport medicines in a dry environment, that is, with a relative humidity of no more than 60 %.

References:

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