



**Measures to ensure the safety of healthcare workers treating
tuberculosis and reduce the transmission of tuberculosis among them**

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Abstract: This study examines the risk factors in the working conditions of medical workers involved in the treatment of tuberculosis, the issues of maintaining their health and preventing the spread of the disease. The study substantiates the importance of measures such as the use of necessary protective equipment, adherence to infection control protocols, regular medical examinations, and ongoing training in occupational safety, due to the high risk of tuberculosis infection among medical workers. It also emphasizes the need for effective ventilation systems, isolation measures in health care facilities, and immunization of employees in risk groups to reduce the spread of the disease. The abstract highlights the relevance of ensuring the safety of medical workers in the process of combating tuberculosis and the effectiveness of a systematic approach.

Keywords: Tuberculosis, healthcare workers, occupational hazards, infection control, protective equipment, prevention, ventilation system, isolation, immunization, health care, safety measures.



Login

One of the most important challenges facing the global health system today is tuberculosis. Tuberculosis (TB) is an infectious disease transmitted to the human body by the bacterium *Mycobacterium tuberculosis*, which mainly affects the lung tissue, but can also damage other organs. According to the World Health Organization (WHO), millions of people are infected with TB every year, and this disease still remains a serious threat globally. The incidence of TB is especially high in developing countries, and Uzbekistan is no exception to this global problem.

The role of medical workers in the fight against tuberculosis is invaluable. It is they who directly communicate with patients, diagnose, carry out the treatment process and carry out epidemiological surveillance. However, in this process, it is medical workers themselves who are at risk of infection. Statistical data show that among medical workers working with tuberculosis, the incidence of this disease is higher than among other health workers. This requires a deeper study of this problem and the development of effective preventive measures.

The risk of tuberculosis infection among medical workers is associated with several factors: prolonged and close contact with patients, insufficient availability of necessary personal protective equipment, insufficient infection control systems in health care facilities, ineffective ventilation systems, and most importantly, a low culture of occupational safety. In addition, healthcare workers are not always attentive to their own health, which can lead to them not undergoing timely screening tests and ignoring early signs. This can lead to the disease not being detected at an early stage and spreading to others.



A number of comprehensive measures are needed to reduce the risk of health workers contracting tuberculosis. These include: the introduction and implementation of strict infection control protocols in health care facilities; the provision of modern and effective ventilation systems; the provision of sufficient personal protective equipment (masks, respirators, gloves, goggles, etc.); continuous training of health workers on occupational safety and raising their awareness; early diagnosis and taking necessary preventive measures through regular medical examinations and screenings. In addition, psychological support, motivational training, and improvement of working conditions also serve to increase the level of safety in the professional activities of health workers. Also, measures such as BCG vaccination of high-risk workers, their regular medical monitoring, and immediate isolation in case of detection of the disease are important in preventing the spread of tuberculosis. Here it is necessary to emphasize another important point: not only technical measures, but also a systemic approach play an important role in the fight against tuberculosis. That is, special algorithms for the prevention of the disease, its early detection, work with patients, training programs, internal control systems, and management strategies should function effectively in each department of the medical institution. This scientific and practical work analyzes the existing problems, risk factors, international experiences and effective measures to ensure the safety of medical workers treating tuberculosis, reduce the transmission of tuberculosis among them. The current situation in the healthcare system of Uzbekistan, existing regulatory documents, national programs and their implementation in practice are also considered. The goal is to develop proposals and recommendations aimed at creating a safe working environment for medical workers working with tuberculosis, maintaining their health and preventing the spread of the disease. The fight against tuberculosis is directly related not only to saving the lives of patients, but also to ensuring the stability and efficiency of the entire healthcare system. Therefore, it is the health of medical workers that is the criterion for the stability of the overall healthcare system.



Taking care of their safety, mental health, professional training and conditions is a guarantee of the health of the entire society.

MAIN PART

1. The danger of tuberculosis and the level of threat to medical workers

Tuberculosis (TB) is an infectious disease caused by *Mycobacterium tuberculosis*, which mainly affects the lung tissue, but also affects other organs and systems. Today, TB remains one of the urgent problems not only in socio-economically underdeveloped countries, but also in countries with developed healthcare systems. Medical workers are the social stratum serving on the front line in the fight against tuberculosis, and they are most at risk of contracting the disease. Especially at risk are phthisiologists, laboratory workers, nurses and sanitation workers who work directly with tuberculosis. Their constant contact with patients significantly increases the likelihood of infection if protective measures for early detection or prevention of the disease are not observed.

2. The need for security measures

Ensuring the safety of healthcare workers is important not only for their own health but also for the continued operation of the healthcare system. If healthcare workers become ill, this disrupts hospital operations, increases the number of patients and reduces the quality of care. Therefore, it is necessary to develop and implement strategies to reduce the transmission of tuberculosis. Studies show that the main causes of tuberculosis infection are:

- Incomplete use of personal protective equipment;
- Direct contact with patients;
- Lack of ventilation of rooms;



- Low immunity among employees;
- Failure to undergo regular medical examinations and tests;
- Failure to use preventive measures.

Types and effectiveness of security measures

3.1. Personal protective equipment (PPE)

Experience has shown that N95 respirators, goggles, disposable gloves, and protective clothing can reduce the risk of TB transmission by 80-95%. Full use of PPE should be made mandatory in high-risk areas.

3.2. Ventilation and quartz disinfection

Tuberculosis bacteria are transmitted through the air. Airing rooms at least 3-4 times a day, disinfecting with quartz lamps, and improving ventilation systems are important factors in stopping the spread of infection.

3.3. Immunoprophylaxis and vitaminization

Increasing the immunity of healthcare workers is one of the most important factors in the fight against the disease. The re-administration of BCG vaccination, anti-tuberculosis drug prophylaxis with isoniazid, and the provision of vitamins C, D, and B have yielded effective results.

3.4. Timely diagnostics and monitoring

Quarterly screening of healthcare workers with X-rays, IGRAs, or Mantoux tests ensures early detection of the disease, which allows for rapid eradication of the disease.

3.5. Psychological and professional preparation



Conducting seminars and trainings among employees to increase knowledge about hygiene, ways of transmission of tuberculosis, and protective equipment will increase their awareness and increase caution. In addition, reducing psychological pressure also has a positive effect on immunity.

4. Analysis of experimental results

- Based on the experiments conducted in 10 large medical institutions in Uzbekistan in 2024, the following results were recorded:
 - Before the start of the experiment, 94 medical workers were diagnosed with tuberculosis;
 - After the implementation of preventive measures, this figure decreased to 13;
 - The overall infection rate decreased by 86.1%;
 - The highest results were observed in cases where PPE, ventilation and immunoprophylaxis were used together;
 - Detection of the disease in the asymptomatic stage (through testing and monitoring) stopped the spread among workers.

5. Problems and recommendations

5.1. Problems

- Lack of PPE in some facilities;
- Outdated ventilation systems;
- Fatigue and stress among healthcare workers;
- Lack of sufficient resources for timely screening.



5.2. Recommendations

- Guarantee the supply of PPE at the state level;
- Install modern ventilation systems in medical institutions;
- Establish psychological support rooms in each institution;
- Provide special additional incentives to staff working with tuberculosis patients;
- Automate the state monitoring system.

Conclusion and suggestions

Healthcare workers treating tuberculosis are a high-risk group. Studies and practical experience show that the risk of tuberculosis infection among these workers is high mainly due to insufficient personal protective equipment, weak ventilation systems, low immunity, and incomplete implementation of routine preventive measures. Based on long-term observation and experimental studies, it has been found that the level of tuberculosis infection among healthcare workers can be reduced by 80–90% through the proper use of personal protective equipment, adequate ventilation of rooms, regular medical examinations, immunoprophylaxis, and increasing professional knowledge. It is also important to strictly adhere to sanitary and hygienic rules for the prevention of tuberculosis in healthcare institutions, provide psychological and social support to employees, and strengthen the legal framework for occupational safety.

Offers

- **1. Develop and implement special safety protocols for medical workers:**
- **o Make it mandatory for all workers working with tuberculosis to wear N95 respirators, goggles, gloves, and special gowns.**



- **2. Organize regular medical examinations:**
- **o Make quarterly tuberculosis tests (Mantou, IGRA) and X-ray examinations mandatory.**
- **3. Provide healthcare facilities with modern ventilation and disinfection systems:**
- **o All tuberculosis departments should be equipped with quartz sterilizers, bactericidal lamps, and automatic air purifiers.**
- **4. Strengthen the immunoprophylaxis system for employees:**
- **o Establish repeated BCG vaccination and drug prophylaxis using isoniazid.**
- **5. Organize regular training and seminars for medical workers to improve their knowledge and skills:**
- **o Training on tuberculosis prevention, safe handling rules, and hygiene should be conducted regularly.**
- **6. Establish psychological support centers:**
- **o Psychologists should provide assistance to employees to maintain immunity by reducing stress and fatigue.**
- **7. Provide additional benefits to employees working with tuberculosis patients:**
- **o Financial incentives, reduced working hours, and annual medical rehabilitation opportunities should be established.**



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