

UDC 616-036.22:614.44:004.738.5

DOI <https://doi.org/10.32782/2519-4151-2025-1-6>

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USE OF INFORMATION AND COMMUNICATION MEASURES FOR THE PURPOSE OF TUBERCULOSIS PREVENTION: SCIENTIFIC AND APPLIED APPROACHES

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УДК 616-036.22:614.44:004.738.5

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**ВИКОРИСТАННЯ ІНФОРМАЦІЙНО-КОМУНІКАЦІЙНИХ ЗАХОДІВ З МЕТОЮ
ПРОФІЛАКТИКИ ТУБЕРКУЛЬОЗУ: НАУКОВО-ПРИКЛАДНІ ПІДХОДИ**

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Вступ. Низькі показники охоплення профілактичними заходами з туберкульозу (ТБ) та несвоєчасне звернення хворих по медичну допомогу призводять до пізнього виявлення ТБ, розповсюдження туберкульозної інфекції, зростання показників захворюваності на занедбані форми ТБ та смертності від нього. **Мета:** дослідити можливості використання інформаційно-комунікаційних заходів з метою профілактики туберкульозу. **Результати дослідження та обговорення.** Профілактика ТБ відіграє велику роль у боротьбі з епідемією ТБ та має багатокомпонентний характер. Виділяють такі напрями профілактики ТБ: специфічну профілактику (вакцинопрофілактику), хіміопрофілактику (профілактичне лікування туберкульозної інфекції (ПЛ ТБІ)), санітарну, соціальну профілактику ТБ та інфекційний контроль. **Висновки.** Покращення вищезазначених заходів можливе в разі скоординованості управлінських дій та рішень в розробленні ефективних моделей з протидії ТБ шляхом використання сучасних інформаційно-комунікаційних засобів вчасного отримання та донесення інформації з ТБ. **Ключові слова:** туберкульоз, профілактика туберкульозу, профілактичне лікування туберкульозу, інформаційно-комунікативна діяльність.

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Introduction. Low rates of coverage of TB preventive measures and untimely seeking medical care by patients lead to late detection of TB, the spread of tuberculosis infection, and an increase in the incidence of neglected forms of TB and mortality from it. **Objective:** to explore the possibilities of using information and communication measures to prevent tuberculosis. **Research results and discussion.** TB prevention plays a major role in the fight against the TB epidemic and is multicomponent in nature. The following areas of TB prevention are distinguished: specific prevention (vaccine prevention), chemoprophylaxis (prophylactic treatment of tuberculosis infection (PT TBI)), sanitary, social prevention of TB and infection control. **Conclusions.** Improvement of the above measures is possible with coordinated management actions and decisions in the development of effective models for combating TB through the use of modern information and communication tools for timely receipt and reporting of information on TB.

Key words: tuberculosis, prevention of tuberculosis, prophylactic treatment of tuberculosis, information and communication activity.

Introduction

Ukraine is among the 30 countries in the world with the highest burden of tuberculosis (TB) [1; 11], and among the 20 countries in the world in terms of prevalence of TB caused by multidrug-resistant (MDR-TB) and extensively drug-resistant (XDR-TB) mycobacteria (MBT); the percentage of drug-resistant TB (DR-TB) cases in the global cohort is 86% of all TB cases [10; 12]. Overcoming the TB epidemic in Ukraine is an extremely important and priority area of social policy and healthcare [1; 4; 9].

The causes of the spread of TB, the possibilities of preventing and combating this disease have been studied by many researchers: the works of Y.I. Feshchenko highlight current trends in research on the problem of the spread of TB (2019) [7], L.D. Todoriko, V.I. Petrenko et al. – showed achievements and difficulties in combating TB in different regions of Ukraine (2020) [6], Y.I. Feshchenko, V.M. Melnyk, M.I. Gumenyuk, M.I. Lynnyk in their works analyzed the epidemiological situation with TB in Ukraine at the current stage (2019) [8], A.M. Nagorna, I.G. Kononova, M.P. Sokolova – studied and analyzed the regulatory and legal regulation of preventive measures and the provision of medical care to people with independent forms of TB and in combination with occupational pathology in Ukraine (2020) [3]. The above-mentioned scientific studies have studied and presented in detail the epidemiological and medical aspects of the spread of TB and the possibilities of preventing its spread, however, the possibilities of using information and communication technologies for the purpose of TB prevention have not yet been studied.

Objective: to explore the possibilities of using information and communication measures to prevent tuberculosis.

Research results and their discussion

TB prevention plays a major role in the fight against the TB epidemic and has a multicomponent nature [3; 4]. There are specific prevention (vaccination prevention), chemoprophylaxis (prophylactic treatment of tuberculosis infection (PT TBI)), sanitary and social prevention of TB, and infection control [6; 8].

Taking into account the peculiarities of the epidemic process of tuberculosis infection, preventive measures to prevent the spread of TB are carried out in the following areas:

1. Preventive measures to prevent the spread of TB among the general population include: social prevention, sanitary prevention, specific vaccine prevention using the BCG vaccine, PT TBI [1; 5; 7].

2. Preventive measures aimed at preventing TB among groups at increased risk of TB disease: dispensary registration and observation of people with TB and people from foci of tuberculosis infection, PT TBI, health and rehabilitation programs, compliance with infection control requirements, regular TB screening [1; 2; 6].

3. Preventive measures in foci of tuberculosis infection (isolation of the bacterium-excretor, examination of contact persons, appointment of PT TBI to contact persons, compliance with infection control, current and final disinfection in the focus) [4; 7]. The above preventive directions are interrelated and should be implemented simultaneously, taking into account the possibility of rapid spread of tuberculosis infection by airborne route.

Social prevention is carried out at the national level and includes measures aimed at improving the living standards and well-being of the population and is carried out through the socio-economic development of the state. To create and implement social TB prevention measures, executive authorities, local governments, primary, secondary and tertiary health care institutions, public and non-governmental organizations should be involved [1; 3; 6]. National measures aimed at improving the health of the population and, as a result, preventing the spread of tuberculosis infection include the following [5; 8]:

- increasing the level of well-being of the population by creating satisfactory working conditions, providing housing and the opportunity to purchase sufficient quantities and proper quality food products;
- promotion and development of a healthy lifestyle, physical culture and sports;
- carrying out activities aimed at combating HIV infection, alcoholism, drug addiction, smoking and other harmful habits;
- organization and carrying out cultural, educational and health-improving activities;
- protection of the environment from pollution by toxic substances;
- improving the living conditions of people with TB and existing MBT secretion who receive antimycobacterial therapy (AMBT) on an outpatient basis at home at their place of residence [1; 6; 10].

Sanitary prevention is one of the components of TB prevention, which is carried out in foci of tuberculosis infection, through sanitary and educational work, sanitary and veterinary supervision, as well as through the implementation of anti-epidemic measures in places where people with TB are first detected [1; 3; 11].

The main task of sanitary prevention is to prevent infection of healthy people from TB patients, protect and train contact persons at home and at work, and organize safe contact with patients with active TB who secrete MBT.

To achieve the set goal, it is necessary to fulfill and adhere to the following tasks [2; 4; 6; 9]:

1. Systematic implementation of sanitary and educational work and promotion of a healthy lifestyle through social advertising in the media and social networks;

2. Issuance of leaflets, memos, booklets, and popular science literature aimed at reducing the stigmatization of people with TB and increasing the level of knowledge about the ways TB spreads,

risk groups, diagnostic and treatment options, and dispelling myths about TB;

3. Inclusion of TB and healthy lifestyle courses in the curricula of primary, secondary general and specialized educational institutions and universities;

4. Timely and mandatory final and current disinfection in epidemic foci of tuberculosis infection.

Tuberculosis infection control (TB IC) involves a set of measures aimed at preventing the risk of TB transmission from sick individuals to healthy individuals [1; 6]. Tuberculosis infection is most often transmitted from people with pulmonary TB to susceptible persons through coughing or sneezing, due to the formation and spread of an infectious aerosol, that is, small particles that are suspended in the air and contain viable MBT [1; 12]. TB IC is based on three main components: administrative control, engineering control and individual respiratory protection [1; 6].

The implementation of TB IC begins with administrative control, which includes management measures aimed at dividing the flow of patients, the allocation of risk zones according to the degree of epidemic danger in order to reduce the probability of contact of healthy people with people who are sick with TB [1; 4; 8].

Engineering controls are aimed at preventing the spread of infectious aerosols and reducing the concentration of MBT in the air, through the use of supply and exhaust ventilation and ultraviolet irradiators [3; 6].

The use of personal respiratory protective equipment, such as surgical masks for infectious TB patients as a barrier to aerosol formation during coughing, and respirators for health workers and caregivers of TB patients with bacterial excretion, is the third level of TB IC and is mandatory in situations with a high risk of MBT transmission [4; 6; 8].

Compliance with infection control measures to prevent TB is a priority for healthcare facilities, places of long-term stay and residence of people with TB. This applies not only to treatment and prevention facilities and homes of people with TB, but also to other institutions that work with groups at high risk of developing TB and people with TB, especially with bacterial excretion [2; 4; 7].

Specific TB prophylaxis, or specific immunoprophylaxis, is carried out using the BCG vaccine [4; 6; 14; 15]. Primary vaccination with the BCG vaccine is carried out in healthy infants weighing at least 2500 g on the 3rd – 5th day of life. Vaccination with a live attenuated BCG vaccine ensures the formation of non-sterile, specific, unstable, cell-mediated immunity against TB [1; 4; 5; 8]. The results of numerous studies prove that vaccine prophylaxis with BCG reduces the likelihood of developing generalized forms of TB, caseous pneumonia, tuberculous meningitis and other fatal forms of TB, which has a positive effect on reducing the incidence and mortality rates of vaccinated individuals due to primary infection with MBT [3; 5; 8; 9].

However, all of the above-mentioned TB prevention measures are still not fully implemented,

which is due, on the one hand, to the insufficient level of awareness of the general population and risk groups on TB and healthy lifestyle issues, and on the other hand, due to the late receipt of information regarding active TB cases and, as a result, ineffective communication between providers of anti-TB services and public administration entities that make management decisions regarding preventive areas and measures to prevent the spread of TB infection.

According to the assessment of the International Partnership “Stop TB”, in 2020–2022, approximately 143 thousand people should be covered by TB preventive measures, undergo TB screening and receive preventive treatment for TB. To this end, a clinical guideline on TB and an operational guide to the consolidated guidelines of the World Health Organization (WHO) on TB have been translated and published [4]. This clinical guideline is an adapted version of the “WHO Consolidated Guidelines on Tuberculosis” published in 2020–2021, which consists of four modules [1; 10; 11; 12; 13]:

- Module 1: Prevention. Preventive treatment of TB [13];
- Module 2: Screening. Systematic screening for TB [12];
- Module 3: Diagnosis. Rapid diagnostics for the detection of TB [11];
- Module 4: Treatment. Drug-resistant TB treatment [10].

These information sources were selected by the working group as examples of best practice in providing medical care to patients with TB, based on the principles of evidence-based medicine regarding the effectiveness and safety of medical interventions, pharmacotherapy and the organization of its provision [1; 10; 11; 12; 13].

The above-mentioned TB Health Care Standards regulate groups at increased risk of developing latent tuberculosis infection (LTBI), regulate quality criteria for diagnosing LTBI based on the principles of evidence-based medicine, and also define basic measures for the examination and preventive treatment of contact persons [1; 4].

According to Module 1 “TB preventive treatment” of the 2020 WHO Consolidated Guidelines on TB, the following categories of individuals are at increased risk of progression from infection to active TB [1; 13]:

- people living with HIV: children over 12 months of age, adolescents and adults with a positive HIV result who are starting antiretroviral therapy (ART);
- HIV-positive pregnant women; children and adults with a positive HIV status who have been successfully cured of TB [1; 13];
- other medical risk groups with a negative HIV status: children and adults receiving treatment with immunosuppressants, tumor necrosis factor-alpha antagonists (anti-TNF- α), hemodialysis, peritoneal dialysis, preparing for transplantation; children and adults with congenital immunodeficiency states (regardless of whether BCG vaccination has been

performed); persons with signs of silicosis and anthracosilicosis [4; 13];

- persons at increased risk of TB: children and adults who have had contact with a bacterially confirmed case of pulmonary TB and/or respiratory TB;

- prisoners and convicts, health workers, immigrants from countries with a high burden of TB, homeless people and people who use drugs [1; 13].

The above-mentioned groups at increased risk of TB disease are subject to TB screening and preventive treatment of latent tuberculosis infection, which is an important area of preventive work to prevent the development of active TB [1; 4; 15].

According to Module 2 “Systematic screening for TB” of the WHO Consolidated Guidelines on TB 2020, TB screening serves two main purposes:

- 1) the first is to ensure that TB disease is detected early and treatment is initiated promptly, with the ultimate goal of reducing the risk of poor treatment outcomes, poor health outcomes, and adverse social and economic consequences of TB [1; 12];

- 2) the second is to reduce the prevalence of TB at the community level by stopping the transmission of MBT and preventing the emergence of new TB cases in the future.

In addition to detecting TB cases, screening can also identify individuals who meet the criteria for PT TBI and potentially need PT TBI once a TB diagnosis has been ruled out, thereby preventing future TB cases [1; 12].

Systematic screening for TB is usually initiated by a health facility. It may be carried out among people who do not seek medical care because they do not have or do not recognize symptoms of TB and do not believe they have a health problem that requires treatment, or do not have access to medical care, or for other reasons [1; 12].

Systematic screening for TB can also be applied among people who seek medical care and have (or do not have) symptoms or signs that may be due to TB, and who cannot be identified during passive detection as probable TB cases [1; 5; 12].

Target populations that should be systematically screened for TB include [1; 5; 6; 12]:

- people with structural risk factors for TB: residents of poor urban areas, homeless people, settlements in remote or isolated areas, migrants, refugees, internally displaced persons and other vulnerable or marginalized groups with limited access to health care [1; 4; 12];

- people living with HIV should be routinely screened for TB at every visit to a health facility [1; 4; 8; 12];

- focal and other close contacts of TB patients [1; 5; 12];

- people in prisons and correctional facilities [1; 6; 12];

- workers who are exposed or have been exposed to silica in the workplace [1; 12];

- people in the general population living in areas with a predicted TB prevalence of 0.5% or higher [1; 9; 12];

- people with an established risk factor for TB who are either seeking or receiving medical care and live in areas where the prevalence of TB in the general population is 100 cases per 100,000 population or higher [1; 8; 12];

- people who have not been treated for TB and have fibrotic lesions of the lungs according to chest X-ray data, can be systematically screened for TB [1; 6; 12].

Tools for screening for TB in the general population and high-risk groups include: symptom screening through a screening questionnaire for adults, children and adolescents, chest X-ray or WHO-recommended molecular tests for the diagnosis of tuberculosis (mWRD), alone or in combination [1; 7; 9; 12].

Also, in medical institutions, TB screening is carried out for individuals seeking medical care for conditions that act as other risk factors for developing TB or adverse consequences of TB [1; 3; 5; 12].

Improving the above measures is possible with coordinated management actions and decisions in the development of effective models for combating TB through the use of modern information and communication tools for timely receipt and dissemination of information on TB, which will significantly facilitate TB surveillance, increase citizens' commitment to TB prevention, reduce stigmatization of people with TB, strengthen partnerships between communities and the non-governmental health sector, and ensure the priority of TB in the development of universal health programs.

Conclusions. TB remains a serious challenge for the healthcare system in Ukraine, which is due to untimely seeking medical care from patients, late diagnosis of all forms of TB, lack of preventive treatment of latent tuberculosis infection for contacts from TB foci, and imperfection of infection control in healthcare facilities with nosocomial transmission of different sensitivity of MBT strains.

The main directions in the fight against TB at the national and subnational levels are preventive measures against TB among the general population and risk groups, and directing them to the active detection of TB through the use of highly sensitive specific TB screening methods (such as mWRD), ensuring PT TBI, compliance with the treatment regimen of active TB.

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Надійшла до редакції 11.04.2025
Прийнята до публікації 13.05.2025
Опубліковано 30.06.2025