

Novel Therapies and Treatment Outcomes of Drug-Resistant Tuberculosis

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DESCRIPTION

Tuberculosis (TB) is one of the world's deadliest infectious diseases, and the emergence of drug-resistant forms of the bacterium *Mycobacterium tuberculosis* has further complicated its management. Drug-resistant TB, particularly Multi Drug-Resistant TB (MDR-TB) and Extensively Drug-Resistant TB (XDR-TB), poses a significant global health threat. In this article, we will explore the novel therapies and treatment outcomes for drug-resistant TB, highlighting recent advancements in the field.

The challenge of drug-resistant TB

Drug-resistant TB develops when the bacterium responsible for TB, *M. tuberculosis*, becomes resistant to one or more of the drugs used to treat the disease. MDR-TB is resistant to two of the most potent first-line TB drugs, Isoniazid and Rifampicin. XDR-TB is even more resistant, being immune to first-line drugs as well as some second-line drugs, making treatment complex and challenging.

Drug-resistant TB is associated with prolonged treatment duration, higher healthcare costs, increased risk of transmission, and a higher likelihood of treatment failure and death. Thus, novel therapies and treatment approaches are urgently needed to combat this growing threat.

Novel therapies for drug-resistant TB

Bedaquiline and Delamanid: Bedaquiline and delamanid are two novel drugs approved for the treatment of drug-resistant TB. Bedaquiline, in particular, has shown significant efficacy in treating MDR-TB. These drugs offer new hope for patients with limited treatment options due to resistance to conventional drugs.

Bedaquiline is often used in combination with other drugs and has demonstrated improved treatment outcomes, reduced mortality rates, and shorter treatment durations. The availability and appropriate use of these drugs have been instrumental in enhancing MDR-TB treatment success.

Newer generation Fluoroquinolones: Newer Fluoroquinolones, such as Levofloxacin and Moxifloxacin, have shown assure in

treating drug-resistant TB. They have improved bactericidal activity against *M. tuberculosis* and are commonly included in MDR-TB treatment regimens.

The use of these drugs in combination therapy has contributed to better treatment outcomes and reduced the risk of further drug resistance development.

Shorter treatment regimens: Conventional treatment for MDR-TB typically involves long and complex regimens lasting up to two years. Research is ongoing to develop shorter, more patient-friendly treatment regimens that can improve treatment adherence and reduce the burden on patients.

A hopeful advancement involves employing the BPaL regimen, consisting of bedaquiline, pretomanid, and linezolid. This regimen has shown high success rates in clinical trials, potentially shortening treatment duration to as little as six months.

Host-Directed therapies: Host-Directed Therapies (HDTs) are a novel approach that targets the host's immune response to enhance TB treatment. HDTs aim to modulate the host immune system, improving its ability to control TB infection.

While still in the experimental stage, HDTs hold assurance as adjunctive therapies to existing TB treatments, potentially shortening treatment duration and improving outcomes.

Treatment outcomes and challenges

Despite these assuring developments, the management of drug-resistant TB remains complex, and several challenges persist:

Treatment adherence: Long treatment durations, complex regimens, and potential side effects can lead to poor treatment adherence, which increases the risk of treatment failure and the development of additional drug resistance.

Stigma and discrimination: Stigma associated with TB can deter individuals from seeking care and adhering to treatment. Addressing stigma remains a significant challenge in TB control efforts.

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Resource constraints: Access to novel drugs and diagnostics can be limited in resource-constrained settings, hindering the effective management of drug-resistant TB.

Co-infections: Patients with drug-resistant TB, particularly MDR-TB and XDR-TB, are often more susceptible to co-infections, such as HIV, which can further complicate treatment.

Drug-resistant strains: The emergence of extensively drug-resistant strains poses a continued threat, as treatment options become increasingly limited.

Improving treatment outcomes

To improve treatment outcomes and combat drug-resistant TB effectively, the following strategies are essential:

Early detection: Rapid and accurate diagnostics are important for early detection of drug-resistant TB, allowing prompt initiation of appropriate treatment.

Patient-centered care: A patient-centered approach, including counselling, psychosocial support, and addressing treatment-related side effects, is vital to improve treatment adherence.

Contact tracing: Sturdy contact tracing and preventive therapy for individuals exposed to drug-resistant TB cases can prevent further transmission.

Surveillance and data sharing: Comprehensive surveillance and data sharing among healthcare providers and organizations can enhance monitoring and evaluation efforts.

Research and innovation: Ongoing research into novel drugs, treatment regimens, and diagnostic tools is essential to stay ahead of drug-resistant TB.

CONCLUSION

The emergence of drug-resistant TB, particularly MDR-TB and XDR-TB, presents a formidable challenge to global TB control efforts. However, recent advancements in novel therapies, including Bedaquiline, Delamanid, and shorter treatment regimens, offer hope for improved treatment outcomes.

While these developments are assuring, addressing drug-resistant TB requires a comprehensive approach that includes early detection, patient-centered care, contact tracing, surveillance, research, and innovation. Only through concerted efforts on a global scale, can we effectively combat the growing threat of drug-resistant mycobacteria and work toward a world where TB is no longer a major public health concern.