

# Primary, Secondary and Tertiary Control Measures of TB

Niazi A. Rahman

*School of Biomedical Science, Curtin University of Technology, Perth WA*

<b>Introduction .....</b>	<b>1</b>
<b>The TB control measures and their unique features .....</b>	<b>2</b>
<b>Primary Prevention Controls for Tuberculosis.....</b>	<b>3</b>
<b>Secondary Prevention Controls for Tuberculosis .....</b>	<b>5</b>
<b>Tertiary Prevention Controls for Tuberculosis .....</b>	<b>5</b>
<b>References .....</b>	<b>7</b>

## Introduction

Tuberculosis is a deadly and widespread infectious disease which is caused by mycobacteria "Mycobacterium Tuberculosis". It most commonly affects the lungs causing pulmonary TB, but can also affect Central Nerve System (CNS), the lymphatic system, the circulatory system, the genitourinary system, bones, joints and even skin (Raviglione & Brien, 2004, 134). According to WHO (2006) Tuberculosis Fact Sheet, over one third of the world's population have TB bacterium in their body and staggeringly in every second, one new case is being added to this community but not all of them show the signs and symptoms of the disease and form the asymptomatic latent TB infection. However, gradually one tenth of latent TB cases turns to active and if not treated establishes a case fatality rate of 50%. The WHO report adds that in 2004, 14.6 millions around the world had active TB form which 8.9 millions were new cases causing 1.7 million deaths mostly in developing countries. It needs to be noted that an increasing number of people in developed countries are also contracting TB due to the use of immunosuppressive drugs, drug abuse and HIV/AIDS. Sobero & Peabody (2006, 1292) claim that the incidence of TB varies widely in the world and it is sometimes different even in neighboring countries due to applying different healthcare programs. Considering the information given above along with many other important issues about TB, World Health Organization introduced TB as a global health emergency in 1993, and recently, the Stop TB Partnership proposed a Global Plan to Stop Tuberculosis aiming to save more than 14 millions lives between 2006 and 2015 (WHO, 2006).

This article discusses the TB control measures and their unique features, focusing on primary, secondary and tertiary control measures appropriate for epidemic emerge of TB in a community and the control measures suitable for TB in an endemic situation.

### **The TB control measures and their unique features**

According to Fine et al. (2001, 381), the prevention and control of TB infection takes two parallel steps; in the first step people with TB infection are identified and treated and in the second step exposed children are vaccinated to protect them from being infected by TB. This guideline, despite its optimistic view, has a high credibility and is effective in controlling TB. Subsequent studies suggest the same classification of the steps and additionally provided more detailed guidelines to be considered while attempting to stop TB spread and preventing the healthy people from being infected by it. One of the most challenging issues about TB is that it has a high tendency to transmit from a person to another particularly at hospitals. To address this issue Sepkowitz (2001, 259) points out that the 1994 CDC guidelines for TB control at hospitals and other health-care facilities have become the basis for all hospital TB control programs. The 1994 guideline divided the implementation strategy into three approaches. Administrative interventions aiming to increase the isolation of suspected cases; development and maintenance of a TB control plan and finally using personal protective equipment (PPE) for example masks and respirators to inhibit contacting TB bacteria. Upon applying all these points the incidence of tuberculosis decreased by 20%. But soon after this success in early 1990s, the emergence of HIV put the control of TB in a complicated position. Many patients got drug resistance because they did not take the correct dose of antituberculosis drug regularly and for the prescribed duration, this challenged the control of TB; considering this, WHO decided to implement more sophisticated and effective control measures for controlling this threatening disease. This time it was decided that healthcare providers directly observe the treatment of TB cases and ensure the eradication of the infection in them. Thus a sensible program by the name of DOTS (Directly Observed Treatment, Short course) was introduced.

The principle of DOTS is to directly observe the patients taking their medication and to ensure that medications are taken properly, in the right combination and for the specific correct duration (WHO, 2007). This WHO-recommended TB control strategy combines and focuses on five components. Government commitment, detection of cases by sputum smear microscopy,

application of the standardized treatment regimen emphasizing on direct observation of the cases treatment for at least first two months period, regular drug supply for the patients to ensure that medication and treatment are not interrupted, and finally the assessment of treatment result by a standardized reporting and recoding system. Thomas (2007) points to “The Stop TB Strategy, the Global Plan to Stop TB, 2006–2015 and targets for TB control” and reveals that the core strategy for eradicating the TB in the mentioned period is DOTS program which was launched in 1995 and treated more than 22 million patients so far. Recently the new six-points shared this success, These six components of Stop TB Strategy for controlling TB for the mentioned period are:

1. Pursuing high-quality DOTS expansion and enhancement.
2. Addressing TB/HIV, MDR-TB and other challenges.
3. Contributing to health system strengthening.
4. Engaging all care providers.
5. Empowering people with TB, and communities.
6. Enabling and promoting research.

This program is to be implemented for the 10 years (2006-2015) as was planned in Global Plan to Stop TB. The target of this strategy is to reduce the prevalence and case fatality rate of TB by 50% until 2015 compared to 1990. And eliminate TB as a public health concern until 2050 -1 case per 1 million populations- (WHO 2007).

From all the information given above it can be obviously seen that the most apparent different characteristic of TB control measure is the DOTS program. The deadly nature of this infectious disease, invoked many thoughts to consider effective ways to cope with this threatening disease and apparently DOTS strategy seems to be the most effective way of treatment, control and prevention of TB in the society.

In addition to DOTS strategy, of course there are some other control measures for TB which can be classified into three categories: primary, secondary and tertiary prevention.

### **Primary Prevention Controls for Tuberculosis**

Primary prevention is the prevention of the disease in susceptible individuals through promotion of healthcare and specific protection, such as immunization. Bannister et al. (2006, 507) define

primary prevention as the prevention of infection or disease generally requiring community-wide public health measures. Some of the primary prevention controls for TB are as follow:

1. Early diagnosis and introducing of cases both latent and symptomatic TBs, to reduce the infectivity period,
2. Preventing contact between susceptible and source of infection (isolation),
3. Altering the number of immune people in the community (immunization, BCG vaccine),
4. Administration of prophylactic therapy for people who are at risk or susceptible,
5. Contact tracing of individuals who are in close contact with cases, e.g. Living in same house,
6. Reducing the risk of transmission in a contact between infected individual and a susceptible. (using PPE personal protective equipment, mask and respirator),
7. Mandatory annual skin testing for all inmates,
8. Sanitation and good nutrition. (Burgner 2006, 1196),
9. prompt medical evaluation of persons with symptoms suggestive of TB,
10. Identification and immediate isolation of cases in crowded environments such as school, barracks, prisons and observing people in that area for developing any symptoms of TB,
11. If a new case is identified in an area, conducting an investigation in that area and extending the investigation to second circle and where needed to third circle,
12. Using effective local exhaustive ventilation, and,
13. Screening for the presence of TB infection and early recognition of TB symptoms utilizing procedures such as PPD skin tests, chest x-ray, and sputum examinations followed by prompt medical evaluation and intervention.

Early success in primary prevention is the result of activities directed at preventing the occurrence of TB in the society for example early diagnosis and treatment of cases and strong close follow-up of this treatment. Moreover, according to Burgner (2006, 1196) before anti-tuberculosis drugs became available optimal nutrition and good housing contributed greatly to decrease incidence of tuberculosis in Western Europe, but prompt diagnosis and treatment remain the most effective means of controlling tuberculosis. Meanwhile Enarson et al. (2005, 1300) state that in infants and non-infected children, BCG vaccination provides a reasonable degree of protection against tuberculosis. In the United Kingdom, at a time when tuberculosis was more common, BCG vaccination of adolescents was 70-80% effective in reducing the incidence of all forms of tuberculosis later in life.

### **Secondary Prevention Controls for Tuberculosis**

Secondary prevention focuses on Identifying and treating people with established disease. Bannister et al. (2006, 508) define secondary prevention as early treatment of infection in people whose TB is confirmed by laboratory tests, e.g. Tuberculin Test, and the prevention of possible complications of the infection or disease. Some secondary prevention controls for TB are as follows:

1. Early detection and prompt antibiotic treatment of confirmed and suspected TB cases,
2. decreasing the intensity and preventing complications,
3. contact investigation,
4. chemoprophylaxis
5. effective surveillance
6. outbreak investigation and management

The purpose of the secondary prevention is to detect early symptoms about which the patient is unaware so that prompt intervention can be considered for control or cure.

### **Tertiary Prevention Controls for Tuberculosis**

Tertiary prevention commonly includes the prevention of the disease progression after it is clinically noticeable and the diagnosis has been established. It also includes the prevention of re-occurrence of the disease. To address this issue, Bannister et al. (2006, 508) state that tertiary prevention mainly focuses on the prevention of the progress, re-infection and possible disabilities of the disease (in the lung). Some tertiary control measures of TB are as follow:

1. Effective treatment of active infection.
2. Management of post-infection disorders.
3. Eliminating the patients' sputum and assuring a hygienic condition of environment.
4. Follow-up of the previous confirmed treated patients for a period of at least 6 months.

All the above mentioned control measures are optimal to implement when there is an outbreak of the TB infection. **In the case of an established endemic TB infection**, most of the mentioned control measures are still needed. The matter with the established endemic infectious disease is that it has already passed and might probably missed the level of primary and possibly secondary preventions so it is wise to think about the treatment of the cases, elimination of the disease and

where possible prevent its complications and disabilities. In the case of TB, even though it seems very challenging to eliminate the disease, still it should be controlled not to get more victims and prevent developing the new cases. As was discussed earlier in the text, the WHO Stop TB Strategy has decided to eliminate TB from the world in 2050. It seems that now by implementing the various control measures discussed earlier authorities are optimistic of eliminating this threatening deadly infectious disease. In this connection, the role of DOTS program which is one of the unique features of TB control measures can not be ignored. According to Freiden (2005, 229), the expansion of directly observed treatment of TB patients has recently expanded and resulted in a great decrease in the incidence of TB in recent years. In addition to the implementing of DOTS strategy, other control measures, such as prophylactic therapy of suspected individual, and immunization of children in the area where TB is endemic is required. People who have close contact with TB cases should be closely observed and screened to ensure that they don't have the infection because sometime the infection is simply latent and shows no symptoms.

Finally, educating people about TB, its sever symptoms and complication, its deadly nature, and the fact that it can be treated and eliminated is an essential theme that should be considered and enthusiastically implemented. By implementing all this we can **hope** that one day in the future TB will not be a public health issue and its incidence and prevalence will be minimized to nearly zero.

## References

- Bannister, B. A., Gillespie, S. H., Jones, J. 2006. *Infection: microbiology and management*. Oxford: Blackwell Publisher
- Burgner, D. 2006. Special considerations in tuberculosis management in children. *BMJ* 332 (10): 1194-1197.
- Enarson, P.M., Enarson, D.A., Gie, R. 2005. Management of tuberculosis in children in low-income countries. *Int J Tuberc Lung Dis* 9:1299-1304.
- Fine, P., Floyd, S., Stanford, J., Nkhosa, P., Kasunga, A., Chaguluka, S., Warndorff, D., Jenkins, P., Yates, M., Ponnighaus, J. 2001. Environmental mycobacteria in northern Malawi: implications for the epidemiology of tuberculosis and leprosy. *Epidemiol Infect* 126 (3): 379-387.
- Frieden, T. R., Paula, I. Fujiwara, P. I., Washko, R. M., & Hamburg, M.A. 2005. Tuberculosis in New York City — Turning the Tide. *The New England Journal of Medicine* 333 (4): 229-233.
- Raviglione, M.C., Brien, R.J. (2004). *Harrison's principles of internal medicine*. 16th ed. New York: McGraw-Hill Professional.
- Sepkowitz, K. A. 2001. Tuberculosis control in the 21<sup>st</sup> century. *Emerging Infectious Diseases* 7 (2): 259-262.
- Sobero, R. and Peabody, J. (2006). Tuberculosis control in Bolivia, Chile, Colombia and Peru: why does incidence vary so much between neighbors?. *Int J Tuberc Lung Dis* 10 (11): 1292–1295
- Thomas, G. 2007. *The Stop TB Strategy, the Global Plan to Stop TB, 2006–2015 and targets for TB control* [http:// www.who.int/](http://www.who.int/) (accessed June 6, 2007).
- WHO (World Health Organization). 2006. *Stop TB Partnership*. [http:// www.who.int/](http://www.who.int/) (accessed June 6, 2007).
- WHO (World Health Organization). 2007. *Tuberculosis Fact sheet N°104 - Global and regional incidence*. <http://www.who.int/> (accessed June 6, 2007).