Brief Report

Monitoring and Evaluation of Program Performance and Management Control System of Tuberculosis: A Ten-Year Cross-Sectional Study in Sistan and Baluchestan Province, Iran

Farhad Motamedizadeh [1], Khalil Alimohammadzadeh [2, 3, *] and Seyed Mojtaba Hosseini [4]

[1] North Tehran Branch, Islamic Azad University, Tehran, Iran
[2] Department of Health Services Management, North Tehran Branch, Islamic Azad University, Tehran, Iran
[3] Health Economics Policy Research Center, Tehran Medical Sciences Branch, Islamic Azad University, Tehran, Iran
[4] Scientific Composition of Health Services Management, North Tehran Branch, Islamic Azad University, Tehran, Iran

Corresponding author: Associate Professor, Department of Health Services Management, North Tehran Branch, Islamic Azad University, Tehran, Iran. Email: irandr_khalil_amz@yahoo.com

Abstract

Objectives: The aim of this study was to monitor and evaluate the program performance and management control system of tuberculosis in Sistan and Baluchestan Province by comparing the annual indicators over ten years.
Methods: This descriptive study was performed in the health departments of the province, using the records of tuberculosis patients during 2006 - 2016. Data were analyzed in SPSS version 23.
Results: The lowest rate of smear-positive pulmonary tuberculosis was reported in 2011 (27.23%). Based on the findings, the incidence of new cases of smear-positive pulmonary tuberculosis showed a downward trend during 2006 - 2016. The highest incidence of new smear-positive pulmonary cases was reported in 2006 (1.69%). According to the findings, to achieve a high success rate in tuberculosis management, revisions are needed in control programs and training workshops for healthcare personnel.
Conclusions: Tuberculosis can be eliminated through correct implementation of directly observed treatment, short-course (DOTS) strategy, implementation of educational and tuberculosis drug programs, and use of correct management policies.

Keywords: Tuberculosis, Program Performance, Management Control System

1. Background

Tuberculosis (TB) is an infectious disease and a major healthcare problem worldwide. It is recognized as one of the major causes of mortality in developing countries (1). According to reports by the World Health Organization (WHO), about two billion people around the world have been infected with TB, and 10 to 20 million new TB cases are added to this number annually, 95% of which is attributed to developing countries (1-3). Nearly 1.3 million children are infected with TB every year around the world, and 450000 children die annually due to TB (2-4). Based on WHO reports, one billion people will be infected with Mycobacterium tuberculosis by the end of 2020 (3-5).

TB is more prevalent in marginal areas, and the highest rate has been reported in Sistan and Baluchestan Province (6-8). This province has shown the highest rate and incidence of TB in the country in the past years (2, 6). The overall incidence of TB in the province is estimated at 109.7 per 100000 people, and the incidence of smear-positive TB is

64.3 per 100000 people (6, 8). Accurate and complete treatment and management of TB are the most important approaches for the control and prevention of this disease (7-9).

2. Objectives

The aim of the present study was to monitor and evaluate program performance and management control system of TB in Sistan and Baluchestan Province by comparing the annual indicators over ten years.

3. Methods

This cross-sectional, descriptive study was performed, using census sampling method. The data of TB patients (indicators of national TB control), which were recorded in the health department of Sistan and Baluchestan Province

from January 2006 to January 2016. This study was approved by the Research Ethics Committee of Islamic Azad University of Medical Sciences, Tehran, Iran. SPSS version 23 was used for data analysis, and scatter plots and linear regression models were applied.

4. Results

According to the information on the provincial TB control system, an improving trend was observed in almost all indicators, especially regarding smear-positive pulmonary TB and new cases of smear-positive pulmonary TB. It represents a downward trend with a negligible slope for completion of treatment for new extra pulmonary and smear-negative patients during 2006 - 2016.

The middle line in the Figure 1 indicates the results of the current system and represents a downward trend, with a relatively high incidence of new smear-positive pulmonary TB during 2006 - 2016. The results of this study shows a downward trend in TB-related mortality during 2006 - 2016.

5. Discussion

The findings confirm that by DOTS strategy, the rate of treatment success increases. Our findings showed that the success of management system in case detection followed a downward trend in Sistan and Baluchestan Province during 2006 - 2016. The success rate of management system was significant in reducing the incidence of new smear positive TB cases in Sistan and Baluchestan during the evaluated period.
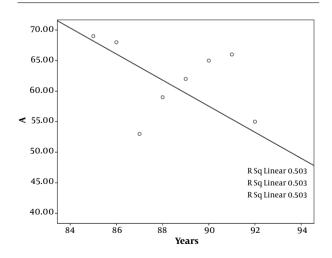

Figure 1. The incidence of new cases of smear-positive pulmonary TB during 2006 - 2016

Table 1. Treatment Indicators in Iranian Versus Non-Iranian TB Patients

	Iran	EMRO	World
Mortality rate[a]	1.1	13	22
Incidence rate[a]	14	114	140
HIV-positive TB[b]	3.8	1.3	10
Successful treatment rate[b]	87	91	83

Abbreviation: EMRO, Eastern Mediterranean Regional Office.
[a]Per 100000 general population.
[b]Values are expressed as No. (%).

Also, the results of this study showed that an increase in per capita income, per capita expenditure on health, per capita expenditure on education, per capita expenditure on sports, reduced smoking, and marriage could have positive effects on the reduction of TB risk. On the other hand, the results showed that simultaneous HIV infection, delayed treatment, poverty of households, lack of access to health facilities, smoking and alcohol, mismanagement of daily activities, and illiteracy increased the mortality rate and reduced the success of TB treatment (4, 8, 10).

The findings showed that other factors, such as age, alcohol consumption, tobacco use, improper nutrition, and lack of access to health facilities and local medicines increased the rate of treatment failure and reduced the success of TB treatment (3, 7). The middle line of the Figure 1 shows the results of the current system and indicates a completely downward trend in TB recurrence during 2006 - 2016. Dooley et al. showed that the success rate of TB treatment increases by implementing DOTS strategy (9).

Evaluation of the success rate of management systems in reducing the number of treatment-resistant TB cases in Sistan and Baluchestan Province during 2006 - 2016 showed a promising trend. The global problem of drug resistance and possible diagnostic issues in Iran indicate the necessity of case detection and proper treatment to improve the conditions. Adineh showed the highest resistance to isoniazid, while PCR assay was found to be an appropriate method for identifying strains sensitive to isoniazid and rifampin (11-13). Some studies suggest that important factors of treatment failure include positive sputum smear in two months after TB and poverty; this finding is almost consistent with the present study (14-16).

Panickar and Hoskyns showed latent TB infection with three months of rifampin-isoniazid treatment was a major part of the TB prevention program (15). The results of this study indicated an acceptable reduction in the incidence of TB treatment failure after treatment of latent TB infection with a rifampin-isoniazid regimen for three months; the results of this study are somehow similar to those of the present study.

5.1. Conclusion

This study showed that TB can be eliminated through correct implementation of DOTS strategy, implementation of educational and tuberculosis drug programs, and execution of correct management policies. The DOTS strategy is also suggested as the most reliable method for confronting drug resistance and recurrence of TB.

Acknowledgments

References

1. Nahid P, Dorman SE, Alipanah N, Barry PM, Brozek JL, Cattamanchi A, et al. Official American Thoracic Society/Centers for Disease Control and Prevention/Infectious Diseases Society of America clinical practice guidelines: Treatment of drug-susceptible tuberculosis. *Clin Infect Dis*. 2016;**63**(7):e147–95. doi: 10.1093/cid/ciw376. [PubMed: 27516382].

2. Rendon A, Centis R, D'Ambrosio L, Migliori GB. WHO strategies for the management of drug-resistant tuberculosis. *Arch Bronconeumol*. 2017;**53**(3):95–7. doi: 10.1016/j.arbres.2016.07.015. [PubMed: 27717622].

3. Falzon D, Schunemann HJ, Harausz E, Gonzalez-Angulo L, Lienhardt C, Jaramillo E, et al. World Health Organization treatment guidelines for drug-resistant tuberculosis, 2016 update. *Eur Respir J*. 2017;**49**(3). doi: 10.1183/13993003.02308-2016. [PubMed: 28331043]. [PubMed Central: PMC5399349].

4. Tavakolpour S, Mirsafaei HS, Elkaei Behjati S, Ghasemiadl M, Akhlaghdoust M, Sali S. Toward cure chronic hepatitis B infection and hepatocellular carcinoma prevention: Lessons learned from nucleos(t)ide analogues therapy. *Immunol Lett*. 2017;**190**:206–12. doi: 10.1016/j.imlet.2017.08.003. [PubMed: 28827021].

5. Wu S, Roychowdhury I, Khan M. Evaluating the impact of healthcare provider training to improve tuberculosis management: a systematic review of methods and outcome indicators used. *Int J Infect Dis*. 2017;**56**:105–10. doi: 10.1016/j.ijid.2016.11.421. [PubMed: 27979785].

6. Moosazade M, Jamshidi M, Amiresmaili M, Nezammahalleh A. A comparison of directly observed therapy and self-administered therapy strategies in treatment of pulmonary tuberculosis: A cohort study in north of Iran. *Middle East J Sci Res*. 2012;**11**(7):873–80.

7. Takarinda KC, Harries AD, Nyathi B, Ngwenya M, Mutasa-Apollo T, Sandy C. Tuberculosis treatment delays and associated factors within the Zimbabwe national tuberculosis programme. *BMC Public Health*. 2015;**15**:29. doi: 10.1186/s12889-015-1437-7. [PubMed: 25631667]. [PubMed Central: PMC4314739].

8. Jalalmanesh S, Darvishi M, Rahimi M, Akhlaghdoust M. Contamination of senior medical students' cell phones by nosocomial infections: A survey in a university-affiliated hospital in Tehran. *Shiraz E-Med J*. 2017;**18**(4). e59938. doi: 10.5812/semj.43920.

9. Dooley KE, Lahlou O, Ghali I, Knudsen J, Elmessaoudi MD, Cherkaoui I, et al. Risk factors for tuberculosis treatment failure, default, or relapse and outcomes of retreatment in Morocco. *BMC Public Health*. 2011;**11**:140. doi: 10.1186/1471-2458-11-140. [PubMed: 21356062]. [PubMed Central: PMC3053250].

10. Atre SR, Murray MB. Management and control of multidrug-resistant tuberculosis (MDR-TB): Addressing policy needs for India. *J Public Health Policy*. 2016. doi: 10.1057/jphp.2016.14. [PubMed: 27153155].

11. Olfatifar M, Hosseini SM, Parvin M. Spatiotemporal analysis of pulmonary tuberculosis in Hamadan province using population attributable risk. *Iran J Epidemiol*. 2017;**13**(1):22–9.

12. Adineh HA, Motametdi B, Veisi M, Bagheri S. Risk factors of tuberculosis treatment failure in South-East of Iran. *J Gorgan Univ Med Sci*. 2014;**16**(2):50–6.

13. Martin LER, Byrne AW, O'Keeffe J, Miller MA, Olea-Popelka FJ. Weather influences trapping success for tuberculosis management in European badgers (Meles meles). *Europ J Wildlife Res*. 2017;**63**(1):30. doi: 10.1007/s10344-017-1089-2.

14. Namukwaya E, Nakwagala FN, Mulekya F, Mayanja-Kizza H, Mugerwa R. Predictors of treatment failure among pulmonary tuberculosis patients in Mulago hospital, Uganda. *Afr Health Sci*. 2011;**11 Suppl 1**:S105–11. [PubMed: 22135634]. [PubMed Central: PMC3220128].

15. Panickar JR, Hoskyns W. Treatment failure in tuberculosis. *Eur Respir J*. 2007;**29**(3):561–4. doi: 10.1183/09031936.00092406. [PubMed: 17135229].

16. de Vries G, van Hest R, Bakker M, Erkens C, van den Hof S, Meijer W, et al. Policy and practice of programmatic management of latent tuberculosis infection in The Netherlands. *J Clin Tuberc Other Mycobact Dis*. 2017;**7**:40–8. doi: 10.1016/j.jctube.2017.02.002.