



ISSN: 2230-9926

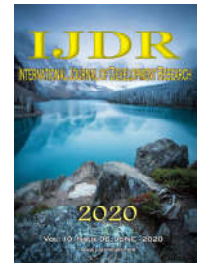
Available online at <http://www.journalijdr.com>

# IJDR

*International Journal of Development Research*

Vol. 10, Issue, 06, pp. 36851-36855, June, 2020

<https://doi.org/10.37118/ijdr.19061.06.2020>



RESEARCH ARTICLE

OPEN ACCESS

## MARKERS OF ADHESION TO TUBERCULOSIS TREATMENT: VALIDATION OF INSTRUMENT

Edilma Gomes Rocha Cavalcante<sup>1\*</sup>, Tânia Maria Ribeiro Monteiro de Figueiredo<sup>2</sup>  
and Maria Rita Bertolozzi<sup>3</sup>

<sup>1</sup>Doutora em Ciência em Enfermagem pela Escola de Enfermagem da Universidade de São Paulo, professora associada da Universidade Regional do Cariri – URCA, Crato, Ceará, Brasil

<sup>2</sup>Pós-doutorado pela Escola de Enfermagem da Universidade de São Paulo, Professora Associada da Universidade Estadual da Paraíba (UEPB), Campina Grande, PB, Brasil

<sup>3</sup>Doutora em Saúde Pública pela Universidade de São Paulo, Professora titular da Escola de Enfermagem da Universidade de São Paulo (EEUSP), São Paulo-SP, Brasil

### ARTICLE INFO

#### Article History:

Received 19<sup>th</sup> March, 2020

Received in revised form

03<sup>rd</sup> April, 2020

Accepted 20<sup>th</sup> May, 2020

Published online 29<sup>th</sup> June, 2020

#### Key words:

Tuberculosis infection; Medication adherence;  
Patient compliance; Primary health care

#### \*Corresponding author:

Edilma Gomes Rocha Cavalcante

### ABSTRACT

**Objective:** To validate an instrument containing markers of adherence to tuberculosis treatment to identify the patients vulnerable to non-adherence to treatment in primary health care. **Methods:** Prospective and of methodological development study was conducted. We utilized construct validation and reliability in an instrument composed of 31 markers, each with a score of 1 to 3, applied to individuals with tuberculosis in the first 30 days of starting treatment, in basic health care units of the municipality of São Paulo, Brazil. Predictions of the groups were done by the receiver operating characteristic (ROC) curve to identify cutoff points on the scale. **Results:** The instrument was applied to 89 individuals with tuberculosis, after subjecting it to validation and reliability, where it ended up being composed of seven markers grouped in three dimensions: Life and family context, Work and health-disease process, Support in the context of health care. Cronbach's alpha coefficient was 0.706 and ROC was 79.8%, with 95% CI of 69.8-89.8%, demonstrating that the group that adhered to treatment showed a better score than those who did not. **Conclusion:** The instrument is adequate with respect to reliability and validity and its use is of great relevance to studying adherence to tuberculosis treatment, in primary health care.

Copyright © 2020, Edilma Gomes Rocha Cavalcante et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Edilma Gomes Rocha Cavalcante, Tânia Maria Ribeiro Monteiro de Figueiredo and Maria Rita Bertolozzi. "Markers of adherence to tuberculosis treatment: validation of instrument", *International Journal of Development Research*, 10, (06), 36851-36855.

## INTRODUCTION

Adherence to the treatment of tuberculosis (TB) is one of the challenges for its control, because it has social and epidemiological consequences such as missing work, persistence of the source of infection, resistance to drugs and increase in mortality (Alves et al., 2012). To improve adherence in Brazil, the Directly Observed Treatment Service (DOTS) was decentralized for all units that assist individuals with TB, mainly in Primary Health Care (PHC), which has as a service Health Strategy of the Family (HSF) and Program of Community Agents Health, aimed at establishing a link (Baral, 2007). However, DOT has not been able to meet the goals for the control of TB, which are <5% dropout and >85% cure of new cases, which is evidence of the insufficiency of the measures implemented (Bertolozzi, Karki, Newell, 2005).

Thus, it is important to identify the determinants of abandonment of treatment and to develop strategies to improve adherence, as pointed out in the National Agenda of Priorities of Research in Health, in Brazil (Brasil, 2011). In the Brazilian literature, there are no instruments available that provide adequate validity and reliability for monitoring adherence to treatment in individuals with TB in the services of the PHC. In the international literature, the instruments identified such as the Morisky scale, Brief Medication Questionnaire (BMQ) and Medication Event Monitoring System (MEMS) (Brasil, 1991) aim to measure adherence to TB treatment, but are limited to compliance of the patient with respect to taking medication, excluding other aspects and dimensions of relevant care in the determination of adherence. The aim of this study was to validate an instrument oriented towards the identification of markers of patient adherence to TB treatment and that can be applied by the staff in the PHC.

## METHODS

We conducted a prospective descriptive study that made use of the findings of a study-matrix<sup>b</sup>, quantitative approach and methodological development regarding the validation and evaluation of instruments and research methods (Breilh, 1991). Study included in the Ph.D. thesis "Markers of adhesion to tuberculosis treatment: a proposal for primary health care." The Theory of Social Determination of the Health-Disease Process was used as a reference marker, which underlies the understanding that the health-disease process is a product of how society is structured. This includes its modes of production and social reproduction, which determine the potentials of strengthening and wear in relation to the health-disease process, and which are expressed in the individual and community scope (Brunello et al., 2009). Also, we utilized the concept of adhesion to treatment, where "(...) it is not reduced to a choice, disconnected from the reality of the patient, but depends on interventions that involve the individual in society, the organization of the work processes in health and accessibility in the broad sense, with respect to the processes related to the development of life with dignity (Bowkalowski, Bertolozzi, 2010)".

With regard to the use of the term marker, whose basis is in the field of social sciences, it makes it possible to understand the health-disease process as part of a process intrinsically associated with the social dimension. Thus, markers are like a radar of vulnerabilities in the process of adhesion to treatment. The original instrument consisted of two open questions and 28 markers, referring to schooling, conditions of life and work, consumption of alcohol, associated diseases, knowledge about TB, aspects of diagnosis and treatment, impact of the disease on life and work, support received in treatment and access to health service. Each marker had two to five possible answers, with scores of 1 to 5, which allowed the grading of potential adhesion. The study was approved by the Ethics Committee of the Secretary of Health of São Paulo Municipality (Decision No. 284/10) and followed the recommendations of Resolution 466/2012 of the Brazilian Health Council. The following was done for validation of the instrument:

**Review of literature:** The PubMed databases, for the period of 2005 to 2010 were reviewed. Other markers were incorporated in the original instrument such as smoking and use of drugs, receiving benefits (snacks, basic basket, transport voucher) and religious belief.

**Validation of Content:** The instrument was sent to three specialists with experience in the development of operational investigations on TB, in the areas of medicine and nursing, who evaluated each marker as: (A) Very important, (B) Somewhat important and (C) Not important. The content validity index (CVI) was accepted if >60%, which represented the majority of the input of the specialists, to validate the content of the original instrument.

**Pre-test of instrument:** We heeded the suggestions of the specialists to improve the instrument; it was necessary to divide the marker trajectory up to the diagnosis into two (health units covered and time to establish the diagnosis). The instrument was finally composed of 31 markers, and each then had 1 to 3 possible answers with scores of 1 to 3, which allowed the grading of potential adhesion.

**Application of instrument:** We used a random and consecutive sample of patients under treatment for TB in 35 basic health care units (BHU) in the central-west region of the municipality of São Paulo. The instrument was divided into two parts, the first with data that characterized the subjects and the second was composed of markers. The latter was applied to the subjects in the first 30 days, before or after the doctor or DOT visit, from September 2010 to April 2011. To finalize the data collection, information on the treatment was obtained in the course of the study up to February 2012. Adhesion was considered when treatment was completed or when there was continued treatment through the finalization of the data collection, and non-adhesion when there was interruption of the treatment for a period of more than 30 days. Inclusion criteria were: patients with TB in first 30 days of treatment, with age  $\geq 18$  years and capacity to communicate and understand. The exclusion criterion was: patients with TB transferred to other BHU outside the São Paulo central-west area. The data were processed in the R Program version 2.13.2, and the following tests were utilized to meet the objective of the study:

**Analysis of construct validation and reliability:** The instrument was composed of 22 markers, which were retained in instrument after the application of Cronbach's alpha. These markers were subjected to factorial analysis, and were found to be adequate by the Kaiser-Meyer-Olkin (KMO) test, giving a value of 0.639; principal components were extracted using varimax rotation, extracting the factors with eigenvalues > 1 and that grouped at least two markers with factorial loads >0.4.

**Predictive validity:** The mean total scores of the groups of the validated instrument were compared between the adhesion (75 patients) and non-adhesion (12 patients) groups, noting that two transferred patients were not included in this analysis. A receiver operator characteristic (ROC) curve analysis was performed, which predicted the discrimination power of the instrument to monitor adhesion to treatment. The level of significance was  $p = 0.05$  for all statistical tests. The t-test was used for comparison of means, which was presented in a box plot.

## RESULTS

A total of 89 subjects with TB participated in the study. Their mean age was 37.2 years (18-77 years), and the majority were males ( $n=67$ ), had not completed primary education ( $n=42$ ), lived with family members ( $n=59$ ) or under other conditions (with friends, street/shelters, work place or donated place) ( $n=16$ ), did not work ( $n=56$ ) due to illness ( $n=31$ ), and believed that they had just enough ( $n=25$ ) or not enough to live on ( $n=32$ ). With respect to clinical and epidemiological aspects, the majority of subjects said that they did not drink alcohol ( $n=79$ ), smoke ( $n=61$ ), or use illegal drugs ( $n=80$ ); most reported having associated disease ( $n=52$ ), principally systemic arterial hypertension, HIV, gastritis or depression, and taking medications for these diseases ( $n=23$ ) besides for TB. Pulmonary TB ( $n=81$ ) was predominant presentation, and the majority were new cases ( $n=66$ ) or had a history of abandoning treatment ( $n=12$ ), visited the DOT ( $n=70$ ) and were followed-up by the HSF ( $n=57$ ) (Table 1). Validation and reliability of the instrument of adhesion to tuberculosis treatment. After the application of Cronbach's alpha, nine markers of the instrument were excluded, leaving a scale composed of 22 markers with an alpha value  $\geq 0.6$ . Factorial

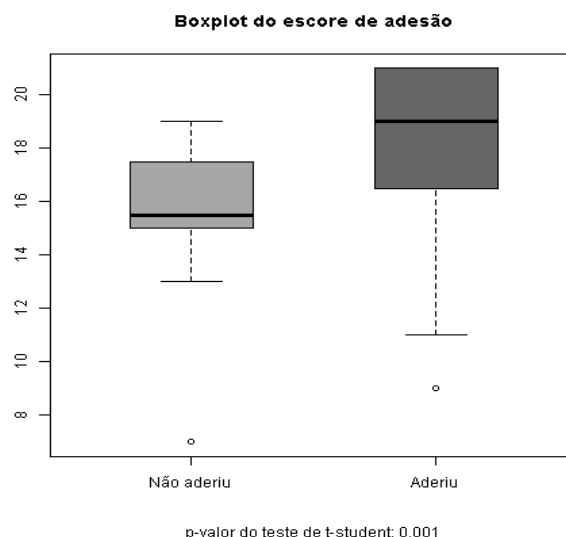
analysis was used to identify which markers showed greater potential to indicate adherence to treatment.

**Table 1. Description of the characteristics of the sample, São Paulo, São Paulo, Brazil, 2010-2012**

CHARACTERISTIC	%
Sex	
Male	75.3
Female	24.7
Schooling	
Illiterate	2.2
Primary education not completed	47.2
Primary education completed	19.1
Secondary education not completed	11.2
Secondary education completed	15.8
Higher education completed	1.1
Post-graduation study	3.4
Was living with whom	
Family	66.3
Others	18.0
Alone	15.7
Working at time of data collection	
No	62.9
Yes	37.1
Reason for not working at time of data collection	
Off due to accident	1.1
Retired	1.1
At home	1.1
Never worked/is student	2.3
Unemployed	22.5
Off due to illness	34.8
Income	
Insufficient	36.0
Sufficient	34.8
Little sufficient	28.1
Unknown	1.1
Consumption of alcohol	
Drinks and gets drunk	2.2
Drinks and does not get drunk	9.0
Does not drink	88.8
Smoking	
Smokes all day	31.5
Does not smoke	68.5
Use of drugs	
Yes, everyday	5.6
Sometimes/stopped due to treatment	4.5
Does not use	89.9
Associated disease	
No	58.5
Yes	40.4
Does not know	1.1
Associated disease and use of medication	
Has associated disease and needs to take other medications	25.8
Has associated disease, but does not need to take medication	14.6
Does not have associated disease	59.6
Clinical presentation of TB	
Pulmonary	91.0
Pleural	4.5
Ganglionar	1.1
Pulmonary and ganglionar	1.1
Pulmonary and pleural	2.3
Followed-up by HSF	
Yes	64.0
No	36.0
Condition of treatment	
New	74.2
Abandonment	13.5
Relapse	12.3
Modality of treatment	
Self-administered	21.4
DOT up to 3 times/week	10.1
DOT up to 5 times/week	68.5
Total	100.0

This process produced nine dimensions (D) and their respective correlation values between the markers. D7, D8 and D9 were excluded, which consisted of one marker, as well as

those that showed an item-factor correlation less than 0.40 (D3 and D6). D1, D2, D4 and D5 were again subjected to Cronbach's alpha analysis and D4 was excluded for not having an alpha  $\geq 0.60$ . The process resulted in three dimensions (D1, D2 and D5) and their corresponding markers (Table 2). The rotated matrix of the dimensions and the factorial loads of each marker were presented by the principal components method, with varimax rotation. Life and family context was designated D1, which was composed of two markers, support from the family and home situation, which referred to the aspects related to quality of life. Work and health-disease process was D2, which grouped the markers having associated disease, telling others about having TB, and work situation. D3 represented Health care service, which resulted in two markers: support in BHU and link/welcome with respect to being heard in the BHU (Table 3). Analysis of the reliability and validity of the instrument The whole instrument obtained a Cronbach's alpha coefficient of 0.706, and the markers showed a correlation greater than 0.30, which demonstrated coherence in relation to the broad concept of adherence. The internal consistency of the scale diminished when any marker of D1 was removed, and thus, their retention improved the homogeneity of the global scale. The three dimensions, composed of seven markers, explained 71.2% of the total variance of the instrument (Table 4). Descriptive analysis of the measurements of the instrument. Considering the potential adherence of the seven markers, the total score was used, which varied from 7 to 21 points, to identify the cutoff point considered optimal. This indicated a sensitivity of 64.0% and specificity of 91.7%, meaning that all subjects with a total score  $\leq 18.5$  would be identified as potentially nonadhering, and above this value, they would have a greater potential of adherence to treatment. The area under the ROC curve was 79.8%, with 95% CI of 69.8-89.8%. Thus, on comparing the medians obtained for the groups, it was seen that the score of those who adhered to treatment had a significantly higher scale value than those who did not ( $p=0.001$ ) (Figure a)



**Figure a. Box plot of the score of the instrument of markers of adherence to treatment for evaluation of the groups, São Paulo-São Paulo, Brazil, 2010-2012**

**Predictive validity:** The seven markers were significant for the groups ( $p<0.001$ ) except D3. On comparing the mean scores of all markers, the lowest (15.417) was for the group that did not adhere to treatment (95% CI: 13-17).

**Table 2. Markers according to dimensions resulting from factor analysis after varimax rotation, São Paulo, São Paulo, Brazil, 2010-2012**

Marker	D1	D2	D3	D4	D5	D6	D7	D8	D9
Life (home situation/living with family members)	0.769	0.158	0.134		0.158	0.187		0.117	0.149
Support on part of family	0.747	0.208			0.148	0.107		0.128	0.252
Drugs	0.457		0.265		0.161				0.329
Associated disease		0.618	0.103	0.205	0.192		0.138		
Talked to someone about disease		0.61		0.106	0.119			0.114	0.228
Work: employment condition	0.286	0.569		0.313	0.165				
Smoking	0.174	0.495	0.151	0.187	0.336	0.195		0.101	
Alcohol	0.135		0.945	0.173		0.112			0.198
Condition of treatment		0.268	0.407	0.179		0.257			
Impact of disease on life	0.135			0.683		0.268			0.215
Impact of disease on work				0.637					0.119
Support in BHU		0.186	0.104		0.767			0.125	
Reception: being heard					0.582			0.112	
Desire to withdraw from treatment			0.106			0.745			
Difficulty in the course of the disease	0.191	0.113		0.347		0.475			
Time needed to reach the BHU	0.149					0.15	0.967		
Schooling		0.237						0.96	
Time seen at BHU	0.151		0.133						0.654
Reception: frequency that health services were consulted in case of doubt.		0.135	0.158				0.287		
Continuity of treatment at BHU	0.393					0.379			
Project of life			0.353	0.161	0.219		0.204	0.157	
Understands the cause of TB				0.226	0.143	0.1	0.321	0.166	0.161

Legend: D= dimensions; BHU = basic health care unit

**Table 3. Reduced markers distributed by factors and respective factorial loads, São Paulo-São Paulo, Brazil, 2010-2012.**

MARKERS	FACTORIAL LOADS			DIMENSION (D)
	1	2	3	
Support on part of family	0.893	0.137	0.091	D1
Life (home situation and living with family members)	0.889	0.090	0.106	
Associated disease	-0.020	0.870	0.109	D2
Work: employment situation	0.426	0.676	0.019	
Talked to someone about the disease: discrimination and stigma	0.092	0.664	0.144	
Support at BHU	0.083	0.256	0.788	D3
Reception: being heard at BHU	0.096	0.005	0.875	

Legend: extraction method: principal component analysis.

**Table 4. Cronbach's alpha coefficient of the dimensions of the instrument of markers of the adherence to tuberculosis treatment and item-total correlation, São Paulo- São Paulo, Brazil, 2010-2012**

Dimension (D)	Marker (Item)	Item-factor correlation	Cronbach's alpha after removal of the item
D1 ( $\alpha=0.796$ )	1. Life (home situation/living with family members)	0.671	-
	2. Support on part of the family	0.671	-
D2 ( $\alpha=0.645$ )	3. Work: employment situation	0.472	0.531
	4. Associated diseases	0.548	0.408
D3 ( $\alpha=0.601$ )	5. Talked to someone about the disease	0.382	0.649
	6. Reception: being heard at BHU	0.443	-
	7. Support at BHU	0.443	-

**Table 5. Scores obtained for markers assessed by Cronbach's alpha coefficient, according to the groups of adherence and non-adherence to tuberculosis treatment, São Paulo, São Paulo, Brazil, 2010-2012**

Variable	Adhesion	No.	Min <sup>1</sup>	Max <sup>2</sup>	Mean	SD <sup>3</sup>	95%CI for mean		P*
							Inf <sup>4</sup>	Sup <sup>5</sup>	
Total score (7 markers)	All <sup>6</sup>	89	7	21	18.022	3.026	17	19	<0.001
	No	12	7	19	15.417	3.147	13	17	
	Yes	75	9	21	18.44	2.834	18	19	
Dimension 1	All	89	2	6	4.955	1.507	4.6	5.3	<0.001
	No	12	2	6	3.5	1.624	2.5	4.5	
Dimension 2	Yes	75	2	6	5.227	1.331	4.9	5.5	0.048
	All	89	3	9	7.281	1.815	6.9	7.7	
Dimension 3	No	12	3	9	6.333	1.723	5.2	7.4	0.445
	Yes	75	3	9	7.4	1.808	7	7.8	
	All	89	2	6	5.787	0.73	5.6	5.9	
	No	12	2	6	5.583	1.165	4.8	6.3	
	Yes	75	2	6	5.813	0.651	5.7	6	

Legend: 1.Min-minimum; 2.Max=Maximum; 3. SD=standard deviation; 4.Inf-inferior; 5.sup=superior; 6.Included the two subjects of the study considered missing.

With respect to the means of the dimensions, the highest were for D1 and D2 in the group that adhered to TB treatment. D3 showed a slightly higher mean for the group that adhered (5.813) (Table 5).

## DISCUSSION

The instrument of markers of adhesion to TB treatment grouped three important dimensions for the patient: *Life and family context*, *Work and health-disease process*, and *Support in the context of health care service*, which included the aspects considered in the concept of adhesion; they were used as a guide to assess adhesion (Bowkalowski, Bertolozzi, 2010). The instrument showed good consistency of the items ( $\alpha=0.706$ ) and sensitivity for determining the patients prone to adhering to treatment. According to the literature, the alpha value should be  $> 0.5$  and considered excellent when  $\geq 0.9$  (Clementino et al., 2011). Factorial analysis also indicated KMO with adequate values (between 0.5 and 1), besides the measure of the quality of fit,  $> 0.5$  (Chirisnos, Meirelles, 2011). The dimension *Life and family context* contained markers referring to the home situation/living with family members and to the support that the patient receives on the part of the family during treatment. In the present study, these conditions differentiated the patients with respect to the process of adhesion. This highlights the necessity of considering the individual in the context of life, which can discourage adhesion to treatment (Gebremariam, Bjune, Frich, 2010), of identifying the necessities of health and of provide emotional and financial support for the follow-up of the treatment (Gebremariam, Bjune, Frich, 2010; Hair et al., 2009; Hinoet al., 2012; Johnson, Wichern, 2007). In this way, when the health care professionals consider this dimension, they will identify the necessities of support and inclusion of other contexts for care management.

With regard to the dimension *Work and health-disease process*, it was found that more unemployed subjects abandoned treatment, when compared to those who were doing some work, even if informally. The impact of unemployment on treatment adhesion in TB patients is known (Ministério da Saúde, 2012) and of resulting aspects that substantiate its exclusion from the basic social policies (eating, home and other) (Monroe et al., 2008). Considering this situation, healthcare professionals should support or ensure the rights to health, which include social justice to be achieved in the control of the disease. The marker associated disease was allocated to this dimension because there has been growing concern over TB among diabetics and, consequently, to adhesion to treatment (Orr, 2011; Paixão, Gontijo, 2007). In the present study, one patient gave up on treatment after substitution of oral insulin by injectable insulin, where this was a practice recommended by Brazilian Ministry of Health (Polit et al., 2004). It is believed that the presence of comorbidities in patients with TB demands greater supervision on the part of the health care professionals, to help these patients with their treatment and in the form of interventions. Furthermore, including the marker not telling family or friends/coworkers about the disease in this dimension was considered consistent for measuring adhesion to treatment. Feelings of fear because of having TB are present daily and can have an impact on adhesion (Queiroz, Bertolozzi, 2010). This points to the necessity of dialogue, about the the health-disease process, which gives meaning to life (Bowkalowski, Bertolozzi, 2010; Sá et al., 2011; Sá et al.,

2007), to interpersonal relationships and drug treatment. With respect to the dimension *Support in the context of health care service*, the marker bond requires the appreciation of the patient and also needs establishment of a support network that brings together the educational, technical and political dimensions (Souza et al., 2010), which contribute to dealing with the structural obstacles to adhesion to treatment. With regard to Support in the BHU, the majority of the subjects in the study reported that they received it, emphasizing its importance for successful adhesion to treatment. This support should be designed based on their needs, with integrated measures that transcend the problems of biological order limited to taking medication or not and the clinical aspects (Bowkalowski C, Bertolozzi 2010; Terra, Bertolozzi, 2008; Van denBoogaard et al., 2011). Therefore, achieving adhesion to treatment of TB requires changes in the practice of health care professionals, with the incorporation of new strategies for care.

## Conclusion

The instrument was shown to be adequate with respect to reliability and validity in the approach and measurement of the adhesion to TB treatment. It provides important analytical approaches for understanding the process of adhesion to treatment, which transcends biological necessities and are linked to life in society. The instrument is an easy technique that considers the social role of the subject, and its use is of great relevance to the study of adhesion to TB treatment in the PHC. This can help in establishing interventions that center on the patient and minimize the structural obstacles to adhesion to treatment, with respect to exclusion and social injustices from which the majority of the patients suffer.

## REFERENCES

- Alves RS, Souza KMJ, Oliveira AAV, Palha PF, Nogueira JA, Sá LD. 2012. Abandono do tratamento da tuberculose e integralidade da atenção na estratégia saúde da família. *Texto contexto - enferm.* [online] 21(3):650-657.
- Baral SC, Karki DK, Newell JN. 2007. Causes of stigma and discrimination associated with tuberculosis in Nepal: a qualitative study. *BMC Public Health*, 7:211.
- Bertolozzi MR. 2005. A adesão ao tratamento da tuberculose na perspectiva da estratégia do tratamento diretamente supervisionado (DOTS) no Município de São Paulo. PhD tese. Escola de Enfermagem, universidade de São Paulo.
- Bowkalowski C, Bertolozzi MR. 2010. With tuberculosis patients' vulnerabilities in the health district of santafelicidade- Curitiba, PR. *Cogitare Enferm* 15(1):92-99.
- Brasil. 2008. Ministério da Saúde. Secretaria de Ciência, Tecnologia e Insumos Estratégicos. Departamento de Ciência e Tecnologia. Agenda nacional de prioridade de pesquisa em saúde. (Série B. Textos Básicos em Saúde). 2 ed. Brasília. Editora do Ministério da saúde, 68p.
- Brasil. 2011. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Vigilância Epidemiológica. Manual de recomendações para o controle da tuberculose no Brasil, 1º Ed. Brasília, 284p. Disponível em: <[http://portal.saude.gov.br/portal/arquivos/pdf/manual\\_de\\_recomendacoes\\_tb.pdf](http://portal.saude.gov.br/portal/arquivos/pdf/manual_de_recomendacoes_tb.pdf)>.
- Breilh J. 1991. Epidemiologia, Política e Saúde. São Paulo: Hucitec.

- Brunello MEF, Cerqueira DF, Pinto IC, Arcênio RA, Gonzalez RIC, Villa TCS, et al. 2009. Interaction between patient and health care professionals in the management of tuberculosis. *Acta Paul Enferm* 22(2):176-182.
- Chirinos NEC, Meirelles BHS. 2011. Factors related to abandoning tuberculosis treatment: an integrative review. *Texto Contexto Enferm*, Florianópolis 2011; 20(3):399-406.
- Clementino FS, Martiniano MSC, Clementino MTSM, Sousa IJC, Marcolino EC, Miranda FAN. 2011. Tuberculose: desvendando conflitos pessoais e sociais. *Rev. enferm. UERJ* 19(4):638-643.
- Gebremariam MK, Bjune G, Frich J. 2010. Barriers and facilitators of adherence to TB treatment in patients on concomitant TB and HIV treatment: a qualitative study. *BMC Public Health.*, 10:651.
- Hair JF, Black WC, Babin BJ, Anderson RE, Tatham RL. 2009. *Análise multivariada dos dados*. 6ª ed. Porto Alegre: Bookman.
- Hino P, Takahashi RF; Bertolozzi MR, Villa TCS, Egry EY. 2012. Family health team knowledge concerning the health needs of people with tuberculosis. *Rev. Latino-Am. Enfermagem* [online] 20(1):44-51.
- Johnson R, Wichern D. 2007. *Applied multivariate statistical analysis*. 6<sup>th</sup>ed. New Jersey: Prentice Hall., pp.773
- Ministério da Saúde (BR). Secretaria de Vigilância em Saúde. Boletim Epidemiológico. Especial Tuberculose. [Internet] Brasília: Ministério da Saúde; 2012 [citado 2012 out 02]; 43: 1-12. Disponível em: <https://www.saude.gov.br/images/pdf/2014/julho/23/BE-2012-43-Mar--o---Especial-Tuberculose.pdf>
- Monroe AA, Gonzales RIC, Palha PF, Sasaki CM, Ruffino Netto A, Vendramini SHF et al. 2008. Envolvimento de equipes da atenção básica à saúde no controle da tuberculose. *Rev. esc. enferm. USP* [online] 42(2): 262-267.
- Orr P. 2011. Adherence to tuberculosis care in Canadian Aboriginal populations. Part 1: definition, measurement, responsibility, barriers. *International Journal of Circumpolar Health* 70(2): 113-127
- Paixão LMM, Gontijo ED. 2007. Profile of notified tuberculosis cases and factors associated with treatment dropout. *Rev. Saúde Pública* [online] 41(2):205-13.
- Polit DF, Beck CT, Hungler BP. 2004. *Fundamentos de pesquisa em enfermagem: métodos, avaliação e utilização*. Porto Alegre: Artmed;
- Queiroz EM, Bertolozzi MR. 2010. Tuberculosis: supervised treatment in North, West and East Health Departments of São Paulo. *Rev. esc. enferm. USP* [online] 44(2):453-461
- Sá LD, Gomes ALC, Nogueira JA, Villa TCS, Souza KMJ, Palha FP. 2011. Intersetorialidade e vínculo no controle da tuberculose na Saúde da Família. *Rev. Latino-Am. Enfermagem* [online] 19(2): 387-395.
- Sá LD, Souza KMJ, Nunes MG, Palha PF, Nogueira JA, Villa TCS. 2007. Tuberculosis treatment in family health units: stories of abandonment. *Texto Contexto Enferm* 16(4):712-718
- Souza KMJS, Sá LD, Palha PF, Nogueira JA, Villa TCS, Figueiredo DA. 2010. Tuberculosis treatment drop out and relations of bonding to the family health team. *Rev. esc. enferm. USP* [online] 44(4):904-911.
- Terra MF, Bertolozzi MR. 2008. Does directly observed treatment ("DOTS") contribute to tuberculosis treatment compliance?. *Rev. Latino-Am. Enfermagem* [online] 16(4):659-664.
- Van den Boogaard JVD, Lyimo RA, Boeree MJ, Kibiki GS, Aarnoutse RE. 2011. Electronic monitoring of treatment adherence and validation of alternative adherence measures in tuberculosis patients: a pilot study. *Bull World Health Organ.* 89(9):632-639.
- Van den Boogaard JVD, Lyimo RA, Boeree MJ, Kibiki GS, Aarnoutse RE. 2011. Electronic monitoring of treatment adherence and validation of alternative adherence measures in tuberculosis patients: a pilot study. *Bull World Health Organ.* 89(9):632-639.

\*\*\*\*\*