



ORIGINAL RESEARCH

THE EFFECTIVENESS OF COUGH ETIQUETTE COUNSELING AMONG PEOPLE WITH PRESUMPTIVE AND CONFIRMED TUBERCULOSIS

Efektivitas Konseling Etiket Batuk pada Terduga dan Orang dengan Tuberkulosis

Gita Sekar Prihanti¹, Nilam Rizki Julianto¹, Aditya Hendra Sasmita¹, Aldi Nurfahmi¹, Annisa Setyautami¹, Debby Rosyida¹, Tiara Muslimawaty¹, Nur'aini Fatmawati¹

¹ Faculty of Medicine of Muhammadiyah Malang University, gitasekarprihanti@gmail.com

Correspondence Author: Gita Sekar Prihanti, gitasekarprihanti@gmail.com, Faculty of Medicine, Muhammadiyah Malang University, Bendungan Sutami Street, Lowokwaru, Malang City, East Java, 65145, Indonesia.

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ABSTRACT

Background: Tuberculosis (TB) is one of the most severe global health problems. The World Health Organization recommends the application of and compliance with infection control measures, one of which is cough etiquette to prevent transmission of pathogenic droplets. **Purpose:** The aim of the current research was to determine the effectiveness of cough etiquette counseling on changes in the knowledge, behavior, and awareness of patients with confirmed and suspected TB at Public Health Center (PHC) of C in K city. **Methods:** This research was designed as a pre-experimental study and was conducted in July 2018. The target population of the research comprised TB patients who were being treated in PHC of C in K city. The inclusion criteria were patients at PHC of C in K city with confirmed TB recorded between January and June 2018 and those with suspected TB reported between May and June 2018. This research was analyze based on univariable and bivariable analysis using T-testing and Wilcoxon testing. **Results:** There were significant differences in knowledge changes before and after cough etiquette counseling (mean difference = 3.72; $p < 0.00$). There was a significant difference in behavior before and after counseling (mean difference = 1.12; $p = 0.04$). There was also a significant difference in awareness before and after counseling (mean difference = 5.89; $p < 0.00$). **Conclusion:** Changes in knowledge, behavior, and awareness were observed in confirmed and suspected TB patients after cough etiquette counseling.

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ABSTRAK

Latar Belakang: Tuberkulosis (TB) adalah salah satu masalah kesehatan global utama. Organisasi Kesehatan Dunia

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merekomendasikan penerapan dan kepatuhan terhadap pengendalian infeksi, salah satunya adalah etiket batuk yang dapat mencegah penularan kuman patogen melalui droplet. Tujuan: Penelitian ini bertujuan untuk menentukan efektivitas konseling etiket batuk pada perubahan pengetahuan, perilaku, kesadaran pasien TB dan suspek TB di Pusat kesehatan masyarakat (Puskesmas) C di Kota K. *Metode:* Desain penelitian ini adalah penelitian pre eksperimental. Penelitian ini dilakukan pada Juli 2018. Populasi target penelitian ini terdiri dari pasien TB yang sedang dirawat di Puskesmas C. Kriteria inklusi meliputi pasien TB yang tercatat pada Januari-Juni 2018 dan pasien suspek TB yang tercatat pada Mei - Juni 2018 di Puskesmas C, kota K. Penelitian ini dianalisis berdasarkan analisis univariabel dan bivariabel menggunakan uji T dan uji Wilcoxon. *Hasil:* Ada perbedaan yang signifikan dalam perubahan pengetahuan sebelum dan sesudah konseling etika batuk (beda rerata 3.72; $p < 0,00$). Ada perbedaan yang signifikan dalam perubahan perilaku sebelum dan sesudah konseling (beda rerata 1.12; $p = 0,04$). Ada perbedaan kesadaran yang signifikan sebelum dan sesudah konseling (beda rerata 5.89; $p < 0,01$). *Kesimpulan:* Terdapat perubahan pada pengetahuan, perilaku dan kesadaran pada pasien TB dan pasien TB suspek setelah konseling etika batuk.

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INTRODUCTION

Tuberculosis (TB) remains one of the most significant global health threats in terms of morbidity and mortality rates. It is a bacterial infection caused by *M. tuberculosis* that affects parts of the body and is most often transmitted to the lungs through inhalation (Agyeman & Ofori-Asenso, 2017). According to Indonesian health profile data, a total of 298,128 TB cases were found across all regions in Indonesia in 2016. East Java had the second-highest number of cases, with 45,239 (Ministry of Health RI, 2017).

Data from the K City Health Office in 2017 showed a total of 706 registered TB patients, comprising 681 new patients and 17 existing patients. In the PHC of C, a total of 58 TB patients were reported in 2017, comprising 33 BTA (+) patients and 21 BTA (–) patients, and 2 patients died. In addition, the center reported 68 patients with suspected TB cases during 2017 (Kediri Health Office, 2018).

To minimize the spread of droplet nuclei, any coughing patient with confirmed or suspected TB should be educated in cough etiquette and respiratory hygiene—the need to cover their nose and mouth with a physical barrier, such as a piece of cloth, tissue, or surgical mask, when sneezing and/or coughing (Jo, 2017). Cough etiquette can be defined as a source control measure intended to limit

respiratory secretion to prevent transmission of respiratory pathogenic droplets in health care environments, especially during seasonal outbreaks of respiratory tract infections in the community (Infection Control Team, 2015).

According to PHC of C's 2017 annual report, one of the problems identified in the facility was a lack of achievement of communication, information, and education around cough etiquette (KIE) in patients. This was achieved with just 2,174 people (70.84% of a total of 3,069 patients) out of a 100% target (Public Health Center of Campurejo, 2017).

Research by Kusbaryanto & Listiowati (2019) has shown that education on cough etiquette with lectures can be effective for improving awareness of this issue. According to Thomas, Snigdha, Karanath, & Swaroop (2017), counseling interventions have a role in increasing knowledge scores. Based on these studies, providing counseling about cough etiquette can help familiarize patients with cough etiquette behaviors. According to Wood et al (2018), cough etiquette is a strategy that may interrupt aerosol dispersal, and airborne infection can be reduced with the retention of cough aerosols. The aim of the current research is to determine the effectiveness of cough etiquette counseling for changes in the knowledge, behavior, and awareness of confirmed and suspected TB patients at PHC of C.

METHODS

The design of this research was a pre-experimental study using cough etiquette counseling as the intervention. The target population of the research comprised confirmed and suspected TB patients who were treated in PHC of C in K city. This study used a total population method with a total of 36 respondents, based on secondary data from PHC of C in K city from June 2018. Inclusion criteria included confirmed TB patients recorded between January and June 2018, and suspected TB patients recorded in May–June 2018, at PHC of C in K city y. The independent variables for this study were counseling for TB and patients with suspected TB. The dependent variables were behavior, knowledge, and awareness around cough etiquette, analyzed by bivariable analysis of pre- and post-counseling data.

All participants were given consent sheets to provide their informed consent to become respondents; the sheet had to be signed by each respondent before the researchers conducted data collection. Respondents had the right to refuse or to withdraw for any reason. The first cough etiquette checklist assessment was carried out with each respondent before they received counseling (pre-test), and the second assessment was conducted after counseling (post-test). The cough etiquette behavior variable was scored using the Pit Stop Program Pendidikan Dokter Spesialis Universitas Brawijaya (PPDS UB) checklist, with responses categorized as "perfect" if the respondents do on four items on the checklist and "imperfect" if the respondents do on less than four items on the checklist. The cough etiquette knowledge variable was scored using the Cough Etiquette Knowledge Questionnaire by Choi & Kim (2016), which consists of 12 statements. These statements were tested pre-test and post-test and both are measured based on the sum of the final scores. The cough etiquette awareness variable was scored using the Cough Etiquette Awareness Questionnaire from the Washington State Department of Health TB Counseling Sheet, consisting of ten statements. These questionnaire were tested pre-test and post-test and both are measured based on the sum of the final scores.

The other variables were gender, age, education, employment status, income, marital status, number of family members, hand-washing habits, and smoking habits—these were analyzed by univariable and bivariable analysis. The variables were categorized into groups based on the respondents' demographic data.

Counseling was given immediately after the pre-test and was received by all respondents at the PHC of C in K city. The counseling took the form of a slide-based media presentation. The information provided about cough ethics included the definition, purpose, procedures, benefits, and importance of cough etiquette. The post-test was conducted one week after the counseling.

Univariable analysis describes variables in the form of frequency distribution. The pre- and post-counseling results were analyzed using paired T-tests and Wilcoxon tests with a significance level of 0.05. The bivariable analysis of gender, employment status, family income per month, marital status, and social history was carried out using the Fisher test as the data did not fulfil the requirements for the chi-square test. The expected count value <5 was $>20\%$, and the number of tables was 2×2 . The data regarding age, education level, and number of family members were analyzed using the Kruskal–Wallis test and post-hoc Mann–Whitney because they did not meet the requirements for the chi-square test. The expected count value <5 was $>20\%$ and the number of tables was $>2 \times 2$. The Shapiro–Wilk method was used for data normality testing because the number of samples was <50 . The results of the Shapiro–Wilk test showed normal data for pre-counseling and post-counseling knowledge ($p > 0.05$) and abnormal data for the pre-counseling and post-counseling awareness and behavior findings ($p < 0.05$). Ethics approval was obtained from the Ethics Committee of the Faculty of Medicine, University of Muhammadiyah Malang (No: E.5a/264/KEPK-UMM/VIII/2018).

RESULTS

This study was conducted on all confirmed TB patients who underwent treatment as well as suspected TB patients in June 2018 at the PHC of C in K city; a total sample of 36 respondents was obtained. Most of the confirmed and suspected TB patients were male and within the 25–34 age group. This means that most of the patients were from a productive age population.

As Table 1 shows, most of the patients in this sample were male, and most of them were educated to elementary-school graduate level. Both the confirmed and suspected TB patients were mostly employed and earned an income under the city minimum wage (CMW) level ($<Rp.1,758,118$). Most of the patients had low levels of education and economic prosperity. Most had been married and had a total of four family members in their house. There were no patients in the sample who lived

alone. All of the patients had a place to wash their hands, had access to clean water, and used soap as a cleanser. Most of the patients also had a social history of smoking.

Table 1

Patient Characteristics: Gender, Age, Education, Employment Status, Income, Marriage Status, Number of Family Members, Hand-Washing Habits, and Social History

Variables	n	%
Gender		
Male	22	61.11
Female	14	38.89
Age (years)		
15-24	6	16.67
25-34	11	30.56
35-44	10	27.78
45-64	6	16.67
>64	3	8.33
Education		
No School	3	8.33
Elementary School	14	38.89
Junior High School	10	27.78
Senior High School	9	25.00
Employment status		
Employed	22	61.11
Unemployed	14	38.89
Income		
>Rp. 1.758.118	15	41.67
<Rp. 1.758.118	21	58.33
Marriage Status		
Unmarried	4	11.11
Married	32	88.89
Number of Family Member		
Unmarried	4	11.11
1 person	0	0.00
2 people	2	5.56
3 people	12	33.33
4 people	13	36.11
5 people	5	13.89
Hand Washing Habits		
There was a place to wash their hands	36	100.00
There was clean water	36	100.00
Soap as a cleanser	36	100.00
Social History		
Smoking	20	55.56
Non-smoking	16	44.44
Total	36	100.00

The results shown in Table 2 regarding the data on gender, age, education, employment status, monthly family income, marriage status, number of family members, and social history indicate that

these factors were not related with cough etiquette behavior ($p > 0.05$). Hand-washing data, the availability of water, and types of cleaning could not be included in the bivariate test because the collected data were constant and undefined. The knowledge difference could therefore be analyzed using the T-test method, while the awareness and behavior differences could be analyzed using the Wilcoxon method.

The results of the T-test, as shown in Table 3, indicate that there was a significant difference between the knowledge levels of both confirmed and suspected TB patients before and after coughing ethics counseling. The differences can be seen through the significance level of $p = 0.00$ ($p < 0.05$). This can be interpreted as showing that coughing etiquette counseling has the effect of increasing knowledge among TB patients and suspected TB patients.

The results of the Wilcoxon test (see Table 3) show a significant difference between the awareness levels of confirmed and suspected TB patients before and after coughing ethics counseling. The differences are indicated by the significance level $p = 0.00$ ($p < 0.05$). This shows that coughing ethics counseling has an effect in terms of increasing awareness among TB patients and suspected TB patients.

The results of the Wilcoxon test also show that the behavior of both confirmed and suspected TB patients differed significantly before and after coughing ethics counseling. The difference is shown through the significance level, $p = 0.04$ ($p < 0.05$). This indicates that coughing ethics counseling has an effect in improving behavior among TB patients and suspected TB patients.

DISCUSSION

In this study's sample, there were more male respondents than female respondents. This is similar to a study carried out in Western Kenya by Nyamogoba & Mbutia (2018), where 54.89% of respondents were male and 45.11% were female. The has Ministry of Health RI (2017) reported that men suffer from pulmonary TB more commonly than women. In contrast, Raza, Rahman, & Nahar (2016) found that women suffer from pulmonary TB more commonly than men because women often face obstacles such as illiteracy, ill health with lower immune status, massive household workloads, and economic dependency, which mean that they have limited access to health care.

Table 2
Bivariate Test Results

Variable	Behavior				p-value
	Perfect		Not Perfect		
	n	%	n	%	
Gender					
Male	3	8.33	19	52.78	1.00*
Female	1	2.78	13	36.11	
Age (years)					
15–24	0	0.00	6	16.67	0.72**
25–34	1	2.78	10	27.78	
35–44	2	5.56	8	22.22	
45–64	1	2.78	5	13.89	
>64	0	0.00	3	8.33	
Education					
No school	0	0.00	3	8.33	0.40**
Elementary school	3	8.33	11	30.56	
Junior high school	1	2.78	9	25.00	
Senior high school	0	0.00	9	25.00	
Employment Status					
Employed	3	8.33	19	52.78	1.00*
Unemployed	1	2.78	13	36.11	
Family Income					
<CMW	3	8.33	18	50.00	0.63*
>CMW	1	2.78	14	38.89	
Marriage Status					
Married	4	11.11	28	77.78	1.00*
Unmarried	0	0.00	4	11.11	
Number of Family Members (people)					
1	0	0.00	4	11.11	0.53**
2	0	0.00	2	5.56	
3	3	8.33	10	27.78	
4	1	2.78	11	30.56	
5	0	0.00	5	13.89	
Social History					
Smoker	2	5.56	18	50.00	1.00*
Non-smoker	2	5.56	14	38.89	
Total	40	11.11	320	88.89	

* Fisher test ; ** Kruskal Wallis test and Post Hoc Mann Whitney

Table 3
Pre- and Post- Counseling Test Results

Variable	N	Mean	SD	p
Awareness				
Pre-Counseling	36	2.94	1.84	.00*
Post-Counseling	36	8.83	1.36	
Knowledge				
Pre-Counseling	36	5.16	1.88	.00**
Post-Counseling	36	8.88	1.11	
Behavior				
Pre-Counseling	36	1.88	.31	.04*
Post-Counseling	36	2.00	.00	

* Wilcoxon test ; ** Paired T test

Based on the age characteristics of the current study sample, there were more respondents aged 25–34 than in any other age group. This is in line with a Ministry of Health RI (2017) report's finding that TB incidence in Indonesia is highest in the productive age group (25–34 years) and research from Nyamogoba & Mbutia (2018), which also shows the 25–34 age group as the group with the highest rates of TB. Overall, TB continues to predominantly affect young adults in their most productive years of life and in the 15–44 age group; in other words, TB mainly infects the productive age group, constituting a high economic burden and

affecting their working potentiality (Raza, Rahman, & Nahar, 2016).

In terms of education levels in the current sample, there were more respondents with an elementary level of education. This is in accordance with Zhang et al (2019) finding that TB patients often have a low level of education, with most being elementary-school graduates. The association between low education status and TB has been documented in many settings, and it has been estimated that one-third of the population in South-East Asia live below the poverty line (Jiamsakul et al., 2018).

Indonesia only has a free education program up to middle-school level (9 years). This means that the majority of less prosperous people can only obtain education to that level, which is still considered as a low educational level. This can lead to lower awareness around maintaining sanitation and environmental hygiene, which is reflected in the finding that the majority of TB patients are still disposing of their sputum carelessly (Ismiarto, Tiksnadi, & Soenggono, 2018).

In terms of the current study sample's working characteristics, more of the respondents were employed. In a study by Raza, Rahman, & Nahar (2016), 47 people (41.89% of the sample) were employed. One of the causes of TB transmission is being exposed to TB during working activities, and workers are also vulnerable to fatigue.

The distribution of the sample characteristics of current study according to income show that most respondents had income levels below the K City CMW in 2018. Raza, Rahman, & Nahar (2016) state that TB occurs more frequently in population groups with low or middle-to-low income levels. In a study by (Hidayat, Setiawati, & Soeroto, 2017), 88 TB patients (91.67% of respondents) had an income level below CMW, which could lead to a delay in accessing health care facilities so that patients with low incomes may take longer to seek their first treatment.

In terms of marital status, most respondents in the current study sample were married. In a study by Hunegnaw, Tiruneh, & Gizachew (2017), 83.00% of the TB patient sample (220 respondents) were married. According to Butiop & Kandou (2015), the household contact factor is associated with the incidence of TB, causing 3.80 times higher risk of contracting pulmonary TB compared with those who do not live with relatives. On other hand, Nurkumalasari, Wahyuni, & Ningsih (2016) findings indicate that, based on the living conditions of Indonesian people, one's marital status does not affect TB incidence; this is because whether a

person is married or unmarried is not the only indicator of whether they live alone. Unmarried people may also live with other family members, such as parents or siblings, which will also affect TB transmission. In the current study sample, the highest number of respondents had four family members. The family environment is a place where TB transmission often occurs. The data analysis confirmed that there was TB transmission among family members in 53 families (90%), while members of only 6 families (10%) contracted TB infections due to transmission from people outside their family.

In terms of hand-washing habits, the results show that all respondents had a place to wash their hands that provided access to clean water and soap as a cleanser. Choi & Kim (2016) state that all the respondents in their study understood the importance of hand hygiene, but their findings are distinguished by the use of alcohol-based cleansers (hand sanitizer) being more common than washing hands with soap. Han's (2018) findings indicate that hand washing is associated with lower TB incidence and mortality at the community level. Hand washing could indirectly influence TB transmission and may also be associated with TB through other health behaviors. The level of respiratory hygiene/cough etiquette compliance of respondents in their study was greater when the daily hand-washing frequency was high. Hand washing also prevents illnesses and the spreading of infections to others.

The results for social history show that more of the respondents were smokers than non-smokers. Patra et al (2015) studied cigarette variables in the form of smoking frequency in a day, finding that 72% of respondents in their research was smoked more than 30 per day. This shows that consuming high numbers of cigarettes will also affect the body to be more susceptible to latent TB infection (LTBI). The role that cigarette smoke plays in the pathogenesis of TB is related to ciliary dysfunction, a reduced immune response, and defects in the macrophage immune response, with or without a decrease in the CD4 count, which increase susceptibility to infection with *Mycobacterium tuberculosis*. The alveolar macrophage binds to the bacillus through complement receptors 1, 3, and 4, and activated lymphocytes release cytokines while recruiting macrophages, fibroblasts, and other lymphocytes. The major cytokine involved in granuloma formation is TNF- α , which is released by macrophages immediately after exposure to *M. tuberculosis* antigens and then activates macrophages and dendritic cells. In smokers, nicotine, acting through the $\alpha 7$ nicotinic receptor,

reduces the production of TNF- α by the macrophages, thereby preventing its protective action and favoring the development of TB.

The results of the T-test for knowledge show that there was a significant difference between knowledge about cough etiquette in confirmed and suspected TB patients before and after being given counseling. Counseling can increase TB patients with confirmed and suspected TB knowledge about cough ethics. The positive direction of the correlation means that the higher the knowledge of coughing ethics, the higher the application of correct cough ethics for patients with confirmed and suspected TB in the PHC of C city area. Research by Choi & Kim (2016) states that adherence to cough ethics is high in populations with high cough etiquette knowledge and also in those with high levels of hand washing. Adequate knowledge about TB increases the capacity of patients to disclose their medical condition, seek care, and adhere to treatment.

The results of Wilcoxon testing for the behavior data indicate a significant difference between ethical coughing behavior in TB patients and suspected TB patients before and after being given counseling. Changes in a positive direction indicate that ethical coughing behavior increased after counseling. According to Thomas, Snigdha, Karanath, & Swaroop (2017), counseling interventions have a role in increasing knowledge scores. Providing information is the first step toward influencing behavior change (Ngigi & Busolo, 2018).

The Wilcoxon test results on awareness show that there were significant differences between the coughing ethics awareness levels of TB patients and suspected TB patients before and after being given counseling. The positive direction of the correlation means that the higher the level of awareness about coughing ethics, the better the coughing etiquette that is practiced by TB patients and suspected TB patients, which will reduce the rate of TB transmission in PHC of C in K city. This is in accordance with research by Kusbaryanto & Listiowati (2019) stating that education on cough etiquette with lectures is effective for improving awareness around this issue. The educational material serves as positive reinforcement and as stimuli for situational awareness of cough etiquette.

Cough etiquette behavior before counseling showed no correlation in any aspect with the characteristics of the respondents. Health education has an important role in changing and strengthening behavioral factors (predisposing, supporting, and driving) to encourage positive behavior from the community. According to Choi & Kim's (2016)

findings, cough ethics adherence increased in people who had previously received education about cough etiquette and in patients who had an awareness of coughing ethics, as well as those who were accustomed to washing their hands and using handkerchiefs or tissues. An individual's behavior is influenced by multiple factors, including customs, attitudes, emotions, values, ethics, power, persuasion, and/or genetics.

According to Aamir, Latif, & Basit (2016), the provision of intensive counseling and the use of modified observation methods as well as a short-term treatment of Tuberculosis Directly Observed Treatment (DOTS) can increase TB cure rates. With adherence to treatment, the cure rate of TB in their sample was 87.70% without relapse within six months of follow-up, and 80% of patients returned to normal life. Counseling improves patients' trust and expectations after TB treatment, thereby increasing their adherence to treatment. The feelings of rejection by the community are significantly related to non-compliance with TB treatment (Hassard, Ronald, & Angella, 2017).

Confidence about perceived health and severity of TB is an important determinant of initial diagnosis. Misperceptions about diseases can create stigma and panic in society, and misinformation or lack of awareness can lead to poor compliance. Research has shown that successful TB control requires a precise and timely diagnosis and treatment with effective anti-TB drugs, among other factors. This shows that drugs are not the only way of controlling TB—other factors, including knowledge and perception, also play a role in preventing and controlling this condition. Accurate knowledge and positive perceptions in the community about TB and its management are prerequisites for seeking early treatment (Ismail & Josephat, 2014).

Due to stigma, TB sufferers can feel inferior and embarrassed. Most stigmas mention that other people will sit at a distance from TB patients to avoid the possibility of infection. Personal stigma and negative attitudes toward TB occur because of fear of transmitting infection, the perceived causes of TB, or wanting to avoid potential discrimination in the community. Meanwhile, community stigma arises from the risk of infection and the relationship between TB and the perceived causes of TB (Sima, Belachew, & Abebe, 2017).

Additionally, comprehensive social support, including health education, psychotherapy, and family and community support interventions, can increase the social support of TB patients compared with individual health education. Qualitative studies

have reported that health education is necessary for patients with TB. Receiving more information about the disease can make patients feel more confident and active in their treatment. Effective education interventions aim to change patient behavior rather than just provide information about the disease (Li et al., 2018).

According to Tola et al (2016), psychological counseling and educational interventions carried out to improve TB treatment based on the concept of the health believe model can increase patients' knowledge levels and health perceptions, reduce the perceived seriousness of TB as a disease, and lead to higher levels of medication adherence among TB patients, showing significant results. In the current study, the results indicated changes in knowledge, attitudes, and perceptions from before to after counseling. Counseling is a process that enhances patients' knowledge and ability to manage their illness, increases their confidence in their own ability to complete treatment, and helps them develop problem-solving skills to address unsupportive environments, families, and communities. Through counseling, patients recognize their own uniqueness and are able to receive support for treatment and to overcome problems that can endanger compliance (Hussain, Malik, & Hussain, 2016).

Research Limitations

There were limitations to the time period of the study, thereby reducing the number of samples. The low education level of most respondents resulted in obstacles in conducting the research due to the difficulty experienced by respondents in filling out the questionnaire and checklist.

CONCLUSION

There were changes in the knowledge, behavior, and awareness of the patients with confirmed and suspected TB before and after counseling. There is an urgent need to develop culturally appropriate, cost-effective and scalable interventions to improve respiratory hygiene practices and to assess their effectiveness in reducing respiratory pathogen transmission.

CONFLICT OF INTEREST

There is no conflict of interest

AUTHOR CONTRIBUTION

GSP carried out the statistical analysis, conception, and design of this article. NRJ and AHS conducted the analysis and interpretation of the data. The article was drafted by GSP, ANA, and AS. Critical revision of the article for pertinent intellectual content was carried out by GSP, DR, and TM. Final approval of the article was confirmed by GSP, NRJ, and NF. Data collection and assembly were completed by NF.

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