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Research Article
Surveillance System Model for Pulmonary Tuberculosis Suspected in Pangkep Region, Indonesia

[1]Masriadi Idrus, [2]Anwar Mallongi and [3]Juliani Ibrahim

[1]Department of Epidemiology, Institute of Health Science Tamalatea, Makassar,
Directorate General of Higher Education of the Ministry of Education and Culture, Jalan Perintis Kemerdekaan KM 12, Kec. Makassar, 90242 Sulawesi Selatan, Indonesia
[2]Department of Environmental Health, Faculty of Public Health, Hasanuddin University, Makassar, Indonesia
[3]Faculty of Medicine, Muhammadiyah Makassar University, Jalan Sultan Alauddin No. 259 Makassar, South Sulawesi, Indonesia

Abstract

Background: Since some challenges are not met in surveillance system. Resulting Case Detection Rate (CDR) less than 70% on suspected and identified sufferers of pulmonary tuberculosis disease. Therefore, effect to the high mortality and morbidity and the national target on case detection rate was not possible to be reached. **Objective:** This study aims to develop surveillance system model by empowering Barazanji participants in Pangkep region. **Methodology:** This study applied a sequence stages such as, first is surveillance system development to detect suspected pulmonary tuberculosis by conducting a survey to Barazanji participants. Reporting pulmonary tuberculosis prevention program analysis and nominal group techniques were used in order to solve several issues that emerged from the development pulmonary tuberculosis suspected disease intervention model. Secondly, do an assessment of the effectiveness the model for pulmonary tuberculosis suspected disease intervention. **Results:** This study shows an increase of successful tuberculosis program in an intervention group. All the knowledge variables after intervention experienced significant changes with p-value 0. 05. In the sense of pulmonary tuberculosis suspect proportion increase from 25.69-34.24%, respectively. Similarly, case detection rate of 51.36% originate from 34.24% in more than 3 months period compare with the control group which was that of 40.5% from 19.25%, whereas the case detection rate remain 20.26%. **Conclusion:** This model was matched with the local conditions since concept as bottom up and suitable with specific for this territory and the result may provide a valuable recommendation for tuberculosis control program in Indonesia.

Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Twenty five percent of all deaths caused by pulmonary tuberculosis disease and it has become the leading cause of death on infectious diseases. About 95% of people suffered from tuberculosis lived in developing countries and 75% of them are in the productive age group (15-50 years), which led to a decrease of work productivity[1]. Based on World Health Organization (WHO) report, within the year of 2007 in Indonesia, the prevalence of tuberculosis is more than 566 individuals/100,000 population with the incidence of pulmonary tuberculosis (TB) disease of more than 228/100,000 population. Multiple Drug Resistance (MDR) was present in 6,427 people[2].

Since pulmonary tuberculosis disease prevention program is administered by the Indonesian government, the Case Detection Rate (CDR) is at the low level, resulting in high mortality and morbidity[3]. From 2005-2009, the proportion of CDR–as indicated in Sarappo and Balang Community Health Center, Pangkep Regency Territory remains low (CDR less than 70%) on suspected and identified sufferers of pulmonary tuberculosis disease.

The target of national case detection rate was not possible to be reached due to the lack of surveillance system coordination, limited budget for the detection of pulmonary tuberculosis disease sufferers, ineffective methods used and uninteresting dissemination materials to influence the detection processes of sufferers. Thus far, the surveillance system at Sarappo and Balang Community Health Center still uses the national surveillance system[4].

Moreover, analysis of pulmonary tuberculosis disease surveillance systems undertaken have encountered several obstacles until now. First, the laboratory does not have the ability to perform sputum examination so it is referred to the microscopic referral health centers (sputum delivery needs approximately 2 days) so, the results are relatively old and not maximal. Second, suspected detection methods that were used, do not appropriate for the conditions of the island community. In this case, the non-formal community group was not yet empowered.

Therefore, the development of surveillance systems by region can be done in terms of increasing coverage of CDR. The rising rates of CDR can be done with the community empowerment approach, which is one of the community development strategies. This may be accomplished by the promotion of community empowerment, to make the community as the main actors in the health development.

Thus, the community can invest in health development such as pulmonary tuberculosis suspected disease intervention.

Sarappo Lompo, Sarappo Ca'di, Balang Lompo and Balang Ca'di islands were chosen as study areas, since they have similar inhabitant's characteristics as well as low suspected and detection proportion of pulmonary tuberculosis, 15.41 and 22.15%, respectively in 2009. Sarappo and Balang are two islands of the Liukang Tupabbiring subdistrict, Pangkep Regency, South Sulawesi[4-12].

One of the community groups in Sarappo and Balang island is the Barazanji activities group. Members of this group have similar characteristics. The first, participants have familiarity with each other, mutual trust, mutual cooperation and have a value that is considered correct by the members as the value of work in religious activities such as housing the mosque, celebration of Prophet's birth, the New Hijri year. Second, Barazanji activity in Sarappo an Balang is an activity that must be carried out, because the communities believe that a disaster would occur if it is not implemented.

The public believe and adhere to the advice of the Barazanji activities group. Whatever is said by the community leaders will be followed by his/her subordinate or community. Therefore, Barazanji activities is expected to increase the discovery rate of pulmonary tuberculosis suspects to be high. Third, the Barazanji activities group relate socially with other people through a wide variety of relationships that based on the principle of voluntary, equality, freedom and dan civility. Consequently, the objective of this study is to develop a surveillance system to detect the suspected pulmonary tuberculosis by empowering Barazanji participants in Pangkep region.

MATERIALS AND METHODS

This study aimed to produce a development model for a suspected pulmonary tuberculosis disease intervention system by empowerment of Barazanji participants in two different scenarios, based on two stages as follows: First step is surveillance system development to detect suspected pulmonary tuberculosis, by conducting a survey to Barazanji participants. Reporting pulmonary tuberculosis prevention program analysis and nominal group techniques were used to solve several issues that emerged from the development pulmonary tuberculosis suspected disease intervention model (Fig. 1).

Another step is an assessment of the effectiveness the model for pulmonary tuberculosis suspected disease
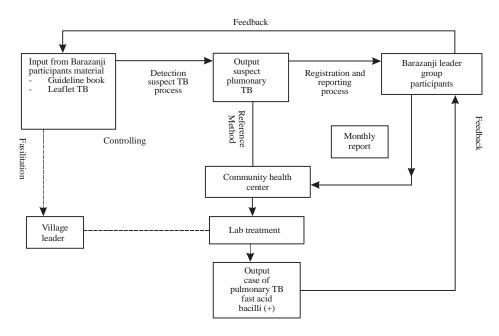
Fig. 1: Surveillance system model of TB pulmonary disease of Barazanji participants

intervention with empowerment of community organization (Barazanji group) was produced from the first stage using the trial plan of the field of post test only control group design using Balang Ca'di and Balang Lompo islands as the control group and Sarappo Ca'di and Sarappo Lompo islands as the intervention group.

Study area and participants

First step of development model: We investigated Barazanji participants go to the mosque who were chosen as the sample population, actively followed the agenda in the mosque on Friday and were lived in Sarappo and Balang islands, Barazanji participants, as follows: Sarappo Ca'di and Sarappo Lompo were 106 participants, sample more than 51 people and Balang Ca'di and Balang Lompo were 123 participants, sample more than 55 people. Sample was measured by using Statistical Product and Service Solution software (SPSS, Inc., version 12) for the cross sectional study with p-value less than 0.05, precision = 10% and proportion[13] (p) = 0.5.

Demographic characteristics (current age of being involved, number of participants and duration of Barazanji activity), general knowledge, willingness of Barazanji participants' action in undertaking the principle of pulmonary tuberculosis suspected intervention, output of free discussions, survey of Barazanji participants and an output reporting analysis were collected. Behavioral characteristics were defined with general knowledge regarding tuberculosis

symptoms, e.g., causes of disease, spreading methods and how pulmonary tuberculosis disease can be treated. Opinions about tuberculosis suspected intervention such as quality of pulmonary tuberculosis disease, medical treatment services, cost and counseling, promotion methods and facilitators were studied.

The principle in conducting tuberculosis suspected intervention was measured by three variables, there were ready to conduct the strategy, ready to record, ready to report and ready to take the form. Participants performed, there were the way determination suspect, data reporting procedure and data recording.

Second step development models

Trial test model/field intervention study: Barazanji participants that fulfilled inclusion criteria were involved in the whole study. For the power 80%, minimal No. of participants should be equal 40 people, intervention and control area of tuberculosis diseases prevention program of community health center are involved too.

Evaluation of surveillance system for Barazanji participants

covered: Surveillance evaluation model of Barazanji participants used the following criteria: case (simplicity), flexibility, accuracy (sensitivity), representativeness, timeliness and punctuality[14]. After intervention, evaluation behavioral changing in related with their outputs (coverage on pulmonary tuberculosis suspected disease and case detection rate).

Data collection: Secondary data included population data and tuberculosis diseases control program indicator at community health center program.

Instrument data collection, data processing and analysis: Instruments that used for secondary data collection of pulmonary tuberculosis disease were six form is a list of suspected tuberculosis sputum of patient and seven form as 3 month identification and tuberculosis treatment form, whereas for the primary data, questionnaire and reporting on Barazanji participants were used. The model was determined by comparing intervention output and control groups. The behavioral changing data before and after interventions were analyzed by using the Mc Nemar test. Since dichotomy variables, paired sample and comparative study to provide any changed after intervention.

Ethics statement: All participants were given a written informed consent. Approval for the surveillance system model was obtained by the Hasanuddin University of Medical Faculty with recommendation number of ethics approval 0472/H04.8.4.5.31/PP36-KOMETIK/2010 for the secretariat for committee for study into human subject and institutional review board of the individual participation center and corresponding health authorities of the region where the study was implemented.

RESULTS

The mean age of Barazanji participants was 37 years, the mean period of being involved in activities was more than 7 years and mean duration of Barazanji activity went 2 h. Barazanji participants' knowledge regarding the cause, sign and spread methods of pulmonary tuberculosis disease remains low (15.68%) but the highest in general knowledge related to signs, symptoms and preventions overall reached more than (37.3%).

Participant's opinion about the medical treatment, at more than (54.90%) thought it was not free. Generally, participants believed that the quality of the medical treatment service of pulmonary tuberculosis did not satisfactory (82.4%).

It was conclude that general knowledge of Barazanji participants remains low. However, all participants ready to participate and be trained for pulmonary tuberculosis suspected disease intervention since participant willingness were (94.11%), (90.19%) registered and reporting (84.31%) ready took the form (Table 1)[15].

Furthermore, in surveillance system model evaluation, the assessment showed that there was no difficulty in applying the model or effective data collection. It can be showed, 88.23% of Barazanji participants reporting form was easy to fill out, had a flexible reporting system path way (94.11%) was accurate for identifying pulmonary tuberculosis disease (58.82%), had representative data completion (92.15%) and punctuality of reporting (88.23%) in (Table 2)[15].

All the knowledge variables after intervention experienced significant changes. The knowledge variables

Table 1: Demographic and behavioral characteristics of Barazanji participants

Characteristics	No.	Mean	Percentage Yes	Percentage No
Age	51	37 (31-47 old)		
Period of being involved in Barazanji	51	6.98 (4-12 years)		
Duration of Barazanji activity	51	2.28 (2.22-2.35 h)		
Behavioral characteristics				
Knowledge regarding TB				
Pulmonary disease				
Cause			27.5	72.50
Sign			37.3	62.70
Spread of methods			15.7	84.30
Opinion about medical treatment				
Not free			45.1	54.90
Quality of service			17.6	82.40
Ready to participated vs no			94.1	15.70
Registered and reporting vs no			90.2	9.80
Ready took the forms			84.3	15.70

Table 2: Output evaluation of surveilans system by Barazanji participants on identifying suspected TB pulmonary disease at Sarappo Territory Pangkep district for 2010

	Surveilans evaluation system criteria by Barazanji participants									
	Ease		Flexibel		Acurate		Represent		Time precision	
	Reporting form		Path system		Detection suspect/BTA(+)		Data completed		Reporting	
Description	Ease	Rather ease	As condition	As not condition	Suspect	BTA(+)	Completed	Not completed	Precise	Not precise
Barazanji participants	45	6	48	3	30	5	47	4	45	6
Percentages	88.23	11.77	94.11	5.89	58.82	41.18	92.15	7.85	88.23	11.77

Barazanji participants identified 30 cases of suspected TB of which 5 were BTA(+)

indicated 2-3 folds increased after intervention, particularly their comprehension on cause, spreading method and healing. Evaluation of knowledge change of Barazanji participants in SarappoTerritory for 2010 (Table 3)[15].

Research model by Barazanji participants on intervention and control groups were significantly different for the proportion pulmonary tuberculosis suspected, intervention of pulmonary tuberculosis disease fast acid bacilli (+) and fast acid bacilli (-) and case detection rate[15] are shown in Table 4.

Success indicator of pulmonary tuberculosis disease intervention program from 1st January to 13th August, 2010 period was higher in the intervention group compared with the control group. Study period on 14th August to 22nd November, 2010 CDR at 85.61% was higher for the intervention group compared with the control group remained at 20.26%.

Table 3: Evaluation of knowledge change of Barazanji participants in Sarappo Territory

Knowledge	Pretest (%)	Postest (%)	Test/p
Cause			
Know	14 (27.45)	42 (82.35)	Mc Nemar
Not know	37 (72.55)	9 (17.65)	p = 0.000
Symptomps			
Know	19 (37.25)	36 (70.58)	Mc Nemar
Not know	32 (62.75)	15 (29.41)	p = 0.000
Spread Methode			
Know	8 (15.68)	38 (74.50)	Mc Nemar
Not know	43 (84.32)	13 (25.5)	p = 0.000
Healing			
Know	16 (31.38)	41 (80.39)	Mc Nemar
Not know	35 (68.62)	10 (19.61)	p = 0.000
Prevention			
Know	19 (37.25)	39 (78.47)	Mc Nemar
Not know	32 (62.75)	12 (21.53)	p = 0.000
Medical treatment periode			
Know	20 (39.22)	44 (86.27)	Mc Nemar
Not know	31 (60.78)	7 (13.73)	p = 0.000

All the knowledge variables after intervention experienced significant changes

DISCUSSION

Age affected to the acceptance of material but the increase of age affected to the ability to remember[16]. However, in this study, the age of Barazanji participants did not affect to the empowerment of pulmonary tuberculosis suspected disease. This study also indicated, general knowledge level were low of Barazanji participants'. Similar to other studies that low level in general knowledge is the non-medic challenges, such as the causal factor for the failure of pulmonary tuberculosis suspected disease intervention[17,18]. Moreover, the lack of information in the community related to the prevention methods, treatments for pulmonary tuberculosis disease and duration of medical treatment to have an effect on increase prevalence and particularly death related to pulmonary tuberculosis disease[19]. Therefore, World Health Organization (WHO) suggested that involvement of communities is increasing the control of pulmonary tuberculosis disease. This could be support to increase the community's knowledge of free health care then to motivate them, when they find some signs of pulmonary tuberculosis, encourage them to seek health care unit services of pulmonary tuberculosis. Barazanji participants more believed that the counseling method of pulmonary tuberculosis, was good carried out by individually.

Similar studies stated that management or special individual will approach to change the behavior in the community, since each individual had different problems or reason in carrying out the action as well as it could cultivate the wish to act to stimulate the discussions emergence their problem[20,21]. Also, they consider that good counseling if health office carried out to the community in accordance with their respective competence. Barazanji participants believe that their community needed specific guidance regarding their experienced conditions[21]. A similar study stated that the

Table 4: Output intervention and control groups before and after research in the Sarappo and Balang Territories in 2010

Description	Indicator	Intervention		Control	
		Coverage	Average/month	Coverage	Average/month
Pretest					
(January, 01-August, 13)	Suspect proportion on	34.24%	4.56%	19.25%	2.56%
	TB pulmonary disease intervention fast acid bacilli (+)	2	0.26	2	0.26
	TB pulmonary disease BT (-)	20	2.66	19	2.53
	Case detection rate	34.24%	4.56%	20.26%	2.70%
Postest					
(August, 14-November,22)	Suspect proportion on	59.93%	17.12%	23.30%	3.10%
	TB pulmonary disease intervention fast acid bacilli (+)	5	1.42	2	0.57
	TB pulmonary disease BT (-)	30	8.57	23	6.57
	Case detection rate	85.61%	24.46%	20.26%	5.78%

counseling method affected how the community received the right health information especially for pulmonary tuberculosis disease[22].

Therefore, involvements of Barazanji participants were beneficial and become an opportunity to participate in suspected pulmonary tuberculosis disease intervention model. Such as empowerment the community principle (community empowerment)[23]. Implementation of the surveillance system required registration and reporting forms. These forms were used to pulmonary tuberculosis suspected disease included blinded identity and the sufferer's complaint. Guide book and leaflet (materials) were used on suspected detection reporting flow in the community. After pulmonary tuberculosis patients suspected were identified, they were then referred to the community health center with a reconciliation form (method) and reported to the leader group. By official, the community health center carried out the laboratory inspection result and given direct feedback/reporting to the leader of the Barazanji participant's group (method). Barazanji leader group gave feedback to Barazanji participants and carried out direct supervision to the pulmonary tuberculosis sufferer disease FAB (+). Supervision was carried out by the community health center and the head of village to facilitate Barazanji participants. Reporting was conducted on the 1st week in every month and reconciliation was carried out by the leader group, then reported to the tuberculosis diseases control program in community health center program, in Fig. 1. First, the territory community empowerment group is participated in religious activity, consist of the head of village, community personages, religious personages and the neighborhood. Second, empowerment system model, it is easy to operate, flexible and accurate in data collection. Third, they have team work manner with health officer of pulmonary tuberculosis prevention program then would have created a harmonic relationship.

Surveillance system evaluation of Barazanji participants showed that there were no difficulties in applying the model. The flexibility/acceptability of the model or surveillance could be adjusted in applying to other diseases. Accuracy (sensitivity) of the surveillance system model could be detected within other illnesses and pulmonary tuberculosis disease and also could forecast the incidence of disease. An accuracy on analyzing the pulmonary tuberculosis illness incidence by paying attention to representativeness and data completeness of surveillance in the field; punctuality (timeliness) criteria showed an increase punctuality of related primary data reporting, quick data analysis and treatment priority for pulmonary tuberculosis disease.

CONCLUSION

Since this concept from the bottom up in community and supported by strong political commitment. Therefore, this model will help each village/sub district to eliminate pulmonary tuberculosis disease in Indonesia. And also this model will be developed further and matched with the local conditions since the concept is specific for this territory.

ACKNOWLEDGMENTS

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