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RESEARCH ARTICLE

The Community Care Model (CCM) for Multi-Drug Resistant of Tuberculosis (MDR-TB) Patient with Social Engagement: A Case Study Province located at Lower Northeastern Part, Thailand

Orathai Srithongtham[1]*, Aomtip Ponboopha [1], Thananphat Naknikorn[1], Norapat Leungratanamart[1], Satian Chualee[1], Jiraphan Inyaphong[1], Ketsuma Wongkrai[2], Pattaraporn Buaphan[2]

[1]Office of disease prevention and control disease region 10th Ubon Ratchathani, Thailand
[2]The provincial health office of Sisaket, Thailand

*Corresponding author: Orathai Srithongtham: tutuubonorathai@gmail.com

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Abstract:

This research was aimed to develop the community care model for Multi-Drug Resistant of Tuberculosis (MDR-TB) patient and to evaluate the community care for MDR-TB patient model. Four steps of method were (1) identify the problem, (2) performance enhancement, (3) model development, and (4) implementation. The 36 sub-districts from 12 districts where found MDR-TB patient was the study areas. Target groups were consisted of MDR-TB patient, TB Clinic people from district and sub-district hospital, care giver who care on drug observe therapy (Dot) to MDR-TB patient, and community leader. Research tools were questionnaires, interview guide, and venue of participation of the stake holders. The data analysis was used descriptive statistics for quantitative data and content analysis for qualitative data.

The model of Multi-drug Resistance Tuberculosis (MDR-TB) Patient Care, "Sisaket Model" was 4 phrases; (1) Early access, "Prepare the readiness of care team", 2-7 day before registered to treatment. Care team at sub-district level was provided MDR-TB case report and communicated to care team, patient assessment, stop taking any drug in case of TB old case, and prepare the readiness for MDR-TB treatment. (2) In-hospital care, "Start treatment and care as MDR-TB patient", 14-28 day in the hospital. The essential activities were case management;

prepare team and community to care of the patient disease investigation and screening TB contact case. (3) Intensive care, "Dot by heart", 3-6 months, the core activities was Dot, drug injection, quality drug assurance and averse drug management (ADM), and prepare area zone for care of MDR-TB patient followed the Infectious control guideline for TB/MDR-TB. And (4) Continuum care, "Cooperation to cope the disease", Dot care continuously, surveillance to ADM, discharge plan and continuously 5 years plan for TB contact cases surveillance by Chest X-ray and for relapse of TB/MDR-TB patient.

Keywords: Model, Patient Care, MDR-TB, Social Engagement

Introduction

Thailand was ranking as 1 of 14 countries where TB (Tuberculosis) and MDR-TB (Multi Drug Resistance Tuberculosis) high burden in the global [1]. The MDR-TB global report was found MDR-TB patient 29,423 cases from 127 countries which was 7 percentage of the prediction 440,000 cases [2] . The study report of treatment outcome of MDR-TB during 2008-2018 was showed cured rate 51.00% (95% CI=9.00-17.00) and complete rate 33.0% (95% CI=10.00-55.00) [3]. In Thailand, MDR-TB patients from 126 hospitals from 2007 to 2009 was registered 248, 327, and 366 cases respectively, XDR-TB (Extremely Multi Drug Resistance Tuberculosis) was 5-8 percentage, and treatment success rate was 40-50 percentage [4]. The treatment outcome MDR-TB /XDR-TB from National Tuberculosis Information Program (NTHIP) from 2015 to 2019 were 57.76%, 58.85%, 58.62, 64.32%, and 61.81% respectively [5].

The success rate treatment of MDR-TB in the area of the office of disease prevention and control region 10th Ubon Ratchathani (ODPC 10th) was 68 percentages [6]. The factor of no income during treatment was influence to non-success of MDR-TB treatment significantly at 0.05. Thus, economic problem of MDR-TB patient was an the main cause of stop of taking medicine more than 2 months and then failure treatment respectively [7]. It was associated to the factor of social support in the dimension of economic and mental support for MDR-TB patient which was led to success rate treatment of MDR-TB at 75.33%. [8].

The research on the factors influencing to MDR-TB treatment outcome were the factor of health behavior such as alcohol drinking during on treatment, malnutrition and low body weight, the factor of economic, the factor of social support and mental status, factor of poor economic, and the factor of health care service consisting of the quality of Dots (Drug observe therapy system) and community participation for care of MDR-TB follow the DOTS-PLUS6, [9-12]. The research on MDR-TB program care and treatment were the comprehensive program which was addressed to early detected of drug resistance and the community care program which was addressed to the community DOT care and it was led to the treatment outcomes efficiently [13-15]. The alternative study of MDR-TB care was found in various aspects such as tele-medicine for MDR-TB at

remote area of Daru, Papua NewGuinea [16] and the medical consultation service for MDR-TB care with COE(Tuberculosis Centerof Excellence) in United States [17].

The principle of CBI (Community Base Initiatives) was applied for the process of community engagement in the level of the individual, group, and associated organization in the community toward the good relationship among personnel, community and society. This engagement was used for the problem coping and solving in the community in form of the community plan, project, or activities [18-19]. The concept of community base was applied to develop the MDR-TB program care and treatment and it was found higher success rate in the community care than the hospital care (Point estimate = 0.68, 95 % CI: 0.59 to 0.76, $p < 0.01$) and the community DOT was found success rate at 75 percentage. However, MDR-TB patient care in the community was needs more public health personnel or a nurse to care management in the community [20-22]. It was associated to the more successful treatment outcome of MDR-TB patient when they were treated at a community-based site (adjusted OR 1.43, P=0.22) [23] and the good adherence pattern of MDR-TB patient during intensive phrase treatment was found 25% of the patient who was DOT by peripheral supervision compare to 0% of the patient who was DOT by central initial health facility supervision [24]. In aspect of home base care for MDR-TB, in India, was found treatment success rate 71.3% and low default rate of 6.9% [25] and CBMDR-TBC (Community Base Multi Drug Resistance Care) in Myanmar patient who "receiving support" when compare to "not receiving support" have more chance of initiating treatment at 80% [26].

The principle of community base initiative and the concept of the community engagement were appropriately to the community care of MDR-TB patient in order to comprehensive and continuum care from the hospital to the community effectively and to enhance the community performance to understand, care and prevention and control of MDR-TB in the community. The question for this issue was how does the MDR-TB care model with community engagement appropriately?.

Objective: To develop the CCM(Community Care Model) for MDR-TB patient by applied the community engagement and participation in one province at lower part of northeastern, Thailand.

The conceptual framework was used the social engagement concept compose of four steps; First step it was identify the MDR-TB problem in the community setting. Second step was to enhance the community participation by providing MDR-TB knowledge of care, treatment, and prevention as well as the skills for community care of MDR-TB patient. Third step was development of the CCM for MDR-TB patient with the participation of stake holders. And fourth step was proposed the model for implementation to the study area.

Research methodology

This study was an applied action research concept of Lewin [27]. It was divided in two Phrases; phrase 1, first year, was step of Plan and Action and phrase 2, second year, was step of Observe and Reflection. This study was the first phase of the development model of community care of MDR-TB. The building of community engagement with the performance enhancement for MDR-

TB care and prevention was the crucial issues of this study. Site study was one province locate in the lower of north eastern part of Thailand and focusing on the area where was found MDR-TB patient consisting of the 12 districts and 36 sub districts.

Target group population was MDR-TB patient and stake holders on MDR-TB care in the community, total 191 people. The MDR-TB patient,51 cases, who was registered as a patient and in period time of treatment, and the stakeholder consisting of the community leader, care giver, and public health personal, detail as followed:

1) Public health personnel from TB clinic of provincial hospital, district hospital clinic, and sub-district hospital 38 people and 2 people from the provincial of public health office.
2) Care giver means public health personnel, health volunteer and family member who care for DOT and general care to MDR-TB in the community, 53 people.
3) The leader of the village where was found MDR-TB patient, 47 people.

Four steps of study were:

First step; Identify and understanding the MDR-TB problem in the community setting.

Second step; Enhancement of the stake holder's performance in the community by providing MDR-TB knowledge of care, treatment, and prevention as well as the skills for community care of MDR-TB patient.

Third step; Development model of the community care for MDR-TB patient, this step was provided the participation of stake holders.

Fourth step; Model implementation by proposed the model of community care for MDR-TB patient to the director of the provincial health office and launch the model implementation in term of the provincial health policy.

Tools and data collection;

(1) Tools for identify the context of MDR-TB problem in the community:

Questionnaires compose of general data and problem context of the community care for MDR-TB patient, community participation to prevention and control of MDR-TB, knowledge of MDR-TB care, treatment and skills of care giver to care of MDR-TB in the community.

Interview guide, compose of the community context, problem and obstacle to MDR-TB care and treatment, and the community support to holistic care of MDR-TB in the community.

(2) Venue for training and meeting;

(2.1) community Venue for data returning to the community comprises of the MDR-TB situation and to approve the data synthesis and GAP of the MDR-TB service system.

(2.2) the operation training for "the community's performance enhancement: MDR-TB knowledge on prevention and control as well as the care and treatment"

(2.3) the operation training for "the CCM for MDR-TB by the stake holders"

(2.4) the operations training for "propose the CCM for MDR-TB to the provincial health office and then implement the model as a provincial policy"

Analysis of the data; Descriptive statistic was used for analyzed the quantitative data and content analysis was used for analyzed the qualitative data.

Research results

The first step: Identify and understanding the MDR-TB problem in the community setting.

The GAP (problem) analysis of MDR-TB care service system can classify in 5 aspects; service system, provider, MDR-TB patient, care giver, and community leader the detail were as followed;

1. The aspect of MDR-TB Service system; service system at sub-district hospital and village level was found the GAP of prepare patient phrase before registered to be MDR-TB patient. The average day of prepare phase was 6.13 days, the shortest was 1 day and the longest was 39 days. During the 6-8 months of treatment was found the patient with hearing loss which causing from SE (side effect) of MDR-TB drug and was found 3 cases who hearing reduction. For the health personnel at sub-district hospital was lacking of skills for care of taking drug via blood vessel and knowledge of MDR-TB care and treatment as well as how to observe SE of MDR-TB drug during treatment. The patient was Dot by family members and observes taking drug by health volunteer who take action substitute to health personnel.
2. The aspect of MDR-TB patient; the classification of MDR-TB patient was found as MDR-TB new cases were 52.9% and from old TB cases were 47.1% consist of Relapse 15.7%, after loss follow-up 13.7, TAF of New 9.8%, and TAF of history of previous treatment 7.8% respectively. Patient was no income during treatment 28.5%, income less than 5,000 baht/month 33.3%, DOT by public health personnel 49.0%, and provided social support, have had self-care, and stigma at middle level, average score was 13.6, 11.65, and 3.25 respectively. The qualitative data was showed the economic problem of MDR-TB patient during treatment due patient stop working for MDR-TB treatment courses for 18-24 months for longer treatment course and 9 months for shorter treatment course. This problem would be getting worse when the patient was the only family members who earn an income. The core problem that effecting to the willpower of MDR-TB patient to face with the MDR-TB treatment was broken home or divorce. Another problems were forgot taking drug, cannot stand to SE from drug, co-disease such as gout, psychosis, HIV, and DM which was made the MDR-TB signs and symptoms getting worse. The stigma problem was found when MDR-TB patient have had risk behavior to MDR-TB distribution in the community such as do not using mask when contact neighbor and group behavior on alcohol drinking and gambling in the community.
3. The aspect of service provider; health personnel at sub district hospital was found lacking the skills for MDR-TB care and service especially for

provide MDR-TB drug via blood vessel. Almost of them were not RN (registered nurse) and they did not allow providing medicines to the patient via blood vessels. Besides, they were lacking of knowledge on IC (Infectious control) and how to prepare the appropriately place for care and drug injection to MDR-TB patient during service provided in the sub district hospital.

4. The aspect of care giver; care giver to MDR-TB patient means who take a role to DOT for the patient. In the area where found the 1st case of MDR-TB patient they were feel frighten due to lacking of the MDR-TB knowledge on how to care, treatment, and prevention the disease. The provincial health office and TB clinic from the provincial and the community hospital were an crucial role to provide them a knowledge. For the community leader and LGO (Local Government Organization) were took a role as social and economic support to the patient and family. Some areas were launch the budget for training the MDR-TB knowledge of care, treat, and prevention and control disease in the villages to the health volunteer and people in the community. Thus the quantitative data was showed that care giver and health volunteer in the villages were trained for MDR-TB care 79.2%. They have had MDR-TB knowledge of care, DOT, and prevention disease and have had ability to care the patient and prevention of disease was high level. The average was score 16.68 and 25.2 respectively. While, the score of MDR-TB stigma in the village was middle level the average score was 2.55.
5. The aspect of community leader; the essential issues of the community leader was lacking of the knowledge on MDR-TB disease such causes of disease, transmission, prevention and control, and care and treatment of the disease. The main point was the community leader should have provided this knowledge to the villagers via village tower every morning and on the village's tradition occasion. The quantitative data was showed they were trained 61.7% and have had ability to care and prevention diseases distribution and transmission in the village at middle level, average score was 23.45. The MDR-TB stigmatization in the village was middle level, average score was 23.45.

In conclusion, the insufficient of knowledge and skills for MDR-TB patient care from 5 aspects as mentioned were how to prepare MDR-TB patient and family as well as the community before registered at provincial hospital?. How to practice MDR-TB case management in the community level? The needs of essential knowledge and skills for MDR-TB care were the principle of IC (infectious control), aDSM (active TB Drug Safety Monitoring and Management), MDR-TB PCC (Patient Center Care), and care of blood vessels for Drip MDR-TB drug.

The second step: Enhancement of the stake holder's performance

The performance enhancement of the care giver and associated people for care of MDR-TB patient in the village was to full filled knowledge and skills followed the insufficient issues from the first step. The operation meeting was designed following the insufficient issues as afore mentioned were as followed;

1) Knowledge on MDR-TB care and treatment and aDSM from the national expert speaker.
2) Case management and MDR-TB case management which was preparation stage for MDR-TB patient and family and treatment

stage at intensive phase (drug injection and oral drug taking 6-8 months) and non-intensive phase (oral drug taking 6-18 months).

3) The ODPC (office of disease prevention and control) region 10th was take a role as technical support and helping for provincial and area that was found MDR-TB cases.
4) Review the provincial policy and guideline for care of MDR-TB patient
5) Lesson learned from successfully care of MDR-TB and XDR-TB care was provide to participants. Lesson learned of MDR-TB patient care from the area where found MDR-TB transmission to people in the village was 5 cases. Lesson learned of XDR-TB patient care was from the patient with various and complicate problems. The lesson learned from two studies areas were how to coping the problem successfully. This session was allowed the participants to share their experiences on MDR-TB patient care in aspect of physical and socio-economic. The target of experiences sharing was how to support the patient to access to health care service, drug adherence, and prevent the disease transmission in the village.
6) Another group activities was to review the role of MDR-TB care and to advice or approved the actually role of MDR-TB care in the community.

The third step: Development model of the CCM for MDR-TB patient, this step was provided the participation of stake holders.

After the first and the second step, the synthesis of MDR-TB care system consisting of the coordination, preparation, and continuum care from the hospital to the community. It was approved by the participants compose of the representative from the provincial hospital and provincial health official, district hospital and district health official, sub district hospital, health volunteer, and community leader. Then, drawing the obviously model was which was comprise of 4 phases; Early access by prepare the patient and family, in-hospital care by 14-28 day of admitted patient in the hospital, Intensive care, and continuum care.

The operation meeting was held on for 2 days for approve the draft model led to model improvement of the CCM for MDR-TB patient. The essential issues improvement in each phase were period time, the goal of each activities, the participant's role, how to do for case management, aDSM, and how to prepare the specific area for care of MDR-TB patient during in the sub district hospital care for MDR-TB disease prevention and transmission.

The result of the CCM with the social engagement for MDR-TB patient was named "Sisaket Model"which was consisting of four phases. The unique of CCM, was emphasizing to the stake holders role to collaborate and create MDR-TB case management in the community level which was obviously seen in each phases of the CCM. The stake holder, in this case, was consisting of health personnel, MDR-TB care giver, health volunteer, family member of the patient, and community leader. The most importance in CCM, "Sisaket Model" was the role on Dot care and surveillance of MDR-TB drug aversion at the village. The one who acting this role was care giver who was found in various group of people such as health personnel, health volunteer and family members of the patient. A detail were as followed;.

Phase1 Early Access: "Prepare the readiness of care team"

Goal; prepare patient and family in aspect of physical, mental, social, and environment. Enhancing the knowledge and ability to prevention and control disease while waiting for seeing the special doctor and registered for provided treatment and admit to in-patient at the provincial hospital.

Period time; within 2-7 days

Core activities;

1. Report MDR-TB case
2. Stop taking TB drug and waiting for changing to MDR-TB drug from the special medical of the provincial hospital
3. Prepares the readiness of the and family members
4. Early assessment of the patient

Phase 2 In-hospital care: "Start treatment and know how care and treatment"

Goal; MDR-TB patient was provided treatment and understanding to treatment plan, drug, self-care and family members, and how to prevention disease as well as the screening case contact MDR-TB patient in patient's household

Period time; within 14-28 days at in-patient department of the hospital

Core activities;

1. Admitted at in-patient department of the provincial hospital for14-28 days
2. Screening contact case in household and the one who contact the patient directly
3. Prepare community for readiness to care of the patient in the community
4. Done for MDR-TB case management

Phase 3 In-hospital care: "DOT by heart"

Goal; MDR-TB patient was provided drug injection 5 days a weeks, completely DOT every day, coping the aDSM, and F/U (follow up) every month.

Period time; within 6-8 months depending on the treatment plan

Core activities;

1. Drug injection and DOT for oral drug with intensively. It should have be care giver for DOT patient. The one is health personnel and/ or family members who can take the patient to provide medicine every day.
2. Drug quality assurance by using the standard method of drug storage place such as sub district hospital where can control the temperature and the humidity appropriately
3. Prevention the disease distribution in household and community by the method of knowledge and skills providing to the one who related to patient and the community
4. Surveillance aDSM , for instance: hearing loss, hepatitis, and t jaundice's signs, it's means care giver should be closely observe to the patient frequently and continuously.
5. Prepare the areas at the sub-district hospital for MDR-TB service for drug injection and taking by concerned the IC technique

Phase 4 Continuum Care: "Cooperation to cope with the disease"

Goal; Patient provide treatment follow the treatment plan, drug adherence completely, the outcome treatment was cure or and complete treatment, and then prepare to D/C (Discharge)

Period time; within 9-24 months depending on the treatment plan

Core activities;

1. Intensive DOT by care giver who was health personnel or health volunteer and setting the period time to taking medicine at the sub district hospital together with patient caregiver and family members.
2. Drug quality assurance the same method of phase3
3. F/U the patient's signs and symptom continuously follow treatment plan
4. D/C both MDR-TB patient aspect and contact person by the patient should be continuously Chest X-Ray every year for 5 years.

Surveillance MDR-TB relapse and prepare to sent the patient to the community. In case of contact people should be surveillance un normal signs and continuously Chest X-Ray every year for 5 years.

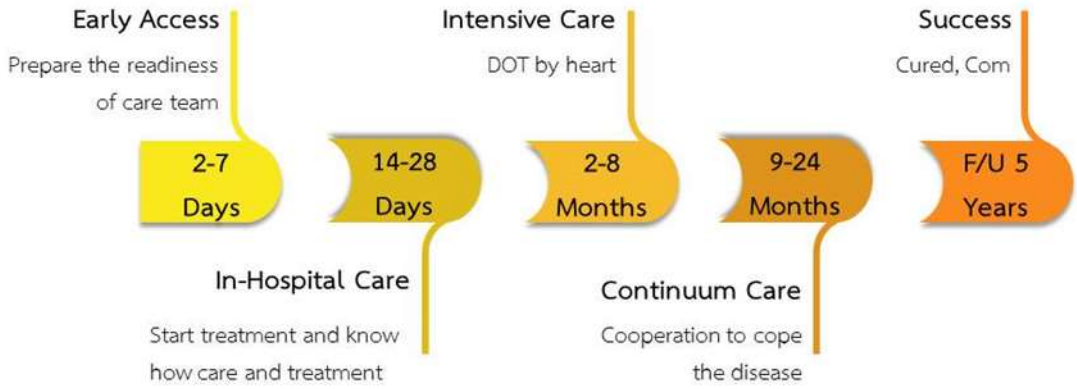
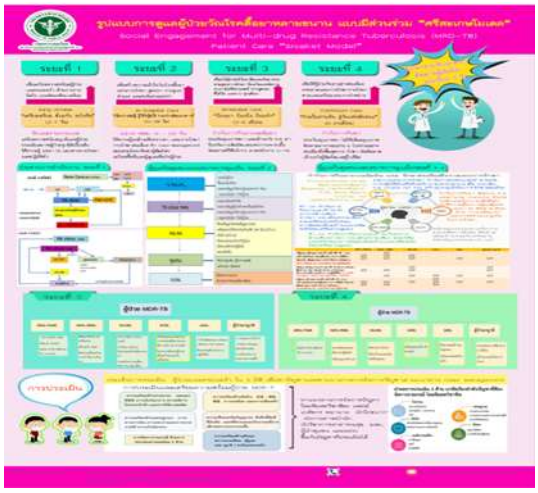


Diagram1 the community care for MDR-TB patient "Sisaket Model"

The support tools to the community hospital and sub-district hospital for practice of the community care for MDR-TB "Sisaket Model" were the manual of the model for practice and poster comprises of three issues; firstly, was the issue of MDR-TB knowledge care, treatment , and MDR-TB case management. The second was MDR-TB drug and aDSM. And the third was IC principle to setting the area of care for MDR-TB at the sub district hospital and how to prevention disease transmission in health care unit at the community.

Picture1: Manual of Sisaket model"



Picture2: Poster-1, Sisaket model, how to prepare MDR-TB patient and the community, and MDR-TB case Management

Picture3: Poster-2, knowledge of MDR-TB disease, treatment, and care

Picture4: Poster-3, community care for MDR-TB, how to setting up zone for MDR-TB care in the community health unit and how to prevent MDR-TB transmission in the family and the community

Fourth step; Model implementation by proposed the model of community care for MDR-TB patient to the director of the provincial health office and launch the model implementation in term of the provincial health policy.

The community cares for MDR-TB patient "Sisaket model" was implement to the provincial in term of provincial policy. The implementation was held on by the participation of the TB clinic person from community hospital and district health office. The operation meeting was design with 2 days as followed; day1 the sub-director of the provincial health office was announce to the participants to

adopt the model for implementation and Day2 was improving the knowledge to understanding the model and how to implement the model in the community. All participants were got the model manual and three posters as a tools for model implementation.

Discussion

This study was discussion into two issues; firstly was the development process of the model and second was the community care for MDR-TB "Sisaket model" as followed;

(1) The development process of the model was consisting of 4 steps;

First step, to analysis and synthesis the MDR-TB situation and problem and sent back to the participants in order to approved and investigate the data. The important things was reflecting the needs of performance development of the TB clinic people, health personnel, care giver, and community leader on the issues of MDR-TB care, treatment, and prevention and control disease in the community.

Second step, performance enhancement of the participants' base on the principle of the community engagement and social engagement. Thus this study was designed the steps of performance enhancement for the participants to full fill the lacking knowledge and skills of the participants. Especially for the MDR-TB case management was done by the provincial level but this model was support the role of the community for run the MDR-TB case management at sub-district level.

Third step, the development model the GAP from synthesis the MDR-TB care system from 1st step was the crucial issues to develop the appropriately care system. For instance, How to prepare the readiness of MDR-TB patient, patient's family and community before seeing the specialist of medical doctor at the provincial hospital. What kind of the community's role to care of MDR-TB patient at 4 phases of model care. The care was comprehensively in the dimensions of physical, mental, and social. People in the community who acting as community care for MDR-TB patient were consist of the public health personnel, health volunteer, community leader, and patient and family members. Besides the outside organization which take a crucial role to support for MDR-TB care in various aspects were compose of the Global fund which was supported toward the Division of Tuberculosis, DDD (department of Disease Control), MOPH (Ministry of Public Health), Thailand, provincial development social and human security, MSDHS (Ministry of Social Development and Human Security). The targets of care were the patient can access to treatment continuously, drug adherence followed the treatment plan, provided the service of aDSM, and success outcome treatment. The obviously model were clearly on the target, crucial activities in 4 phases of the model, stake holder's role for care of MDR-TB in the community, time period of care in each phase, and especially for the principle of MDR-TB case management and the community's role for MDR-TB care. The clearly model as mentioned was difference from afore MDR-TB cares system.

Forth step, The community care for MDR-TB patient "Sisaket Model" was trained for two days to the representative of public health personnel, 60 people, cover all district where was found MDR-TB patient. Beside, the sub-director of the provincial health office was announcing the MDR-TB care policy by suing the "Sisaket model" to the participants as a guideline of MDR-TB care policy.

The model development process was applied the concept of social engagement conceptual framework. It was appropriate to the community context in the dimension of the individual and group participation after they were provided the skills and knowledge of MDR-TB patient care in the community level. The researcher was action as a facilitator to analysis and synthesis the MDR-TB situation and problem of care system and full filled the inefficiency skills and knowledge for MDR-TB care to the participants. The mobilization of the process of Sisaket model development was depending on the performance enhancement of the participant. The one target of the community care model for MDR-TB patient was led to the successful treatment outcome of MDR-TB.

(2) The second was the community care for MDR-TB "Sisaket model" The "Sisaket model" was associated to the basic belief of action research in 4 components [28], (1) the problem solving method form the study was better than the command of the leader, (2) the occasion of research result for problem solving which was the researcher was the practitioner was more successful than the researcher was the other. (3) Research was the skills that the practitioner can learn and done. (4) the performance development by trained was the foundation of work operation. Thus, this study was the action research. The method was used to develop the Sisaket model of the community care for MDR-TB. The fourth components and the action research was designed for the Sisaket model development which was MDR-TB situation analysis, performance enhances of the participants, and the participation for development model.

The importance issues in the community care for MDR-TB "Sisaket model" were the 4 dimensions for instance physical, mental, social, and economic and the role of community care for MDR-TB patient in each phase of the model. The breaking point obviously of the model was used the MDR-TB case management at the community level by address the role of sub-district hospital and community TB clinic this point was associated with the study of Sonya Shin9 on the comprehensive care of integrated team for MDR-TB patient in the community at Lima and Peru. The patient care was in the dimension of the physical, mental, economic, and social including the intensive course training for performance enhancement of MDR-TB care giver at the community level.

Conclusion

CCM of MDR-TB development, "Sisaket model", was emphasizing to the community engagement. The process was beginning with the clearly understanding of MDR-TB problem, performance enhancement, and then obviously role on care of MDR-TB patient in the community setting. This model was focusing on comprehensive care to the patient: in the dimension of physical, mental, and socio-economic comply with the specific care on DOT and ADSM intensively.

Recommendation

To implement the CCM of MDR-TB/XDR-TB the provincial health office should be done by provincial policy. The activities are to promote and support the community with three core issues; firstly, the knowledge, skills, community care for MDR-TB. Secondly, case management of MDR-TB to the sub-district

hospital and the community hospital in order to emphasize the CCM for MDR-TB patient and followed the treatment plan during period of time, 18-24 months. And thirdly, the comprehensive care; the dimensions of physical, mental, socio-economic, and preventive risky behaviors of disease transmission.

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