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A Qualitative Study to Assess the Availability of Resources at Microscopic Centers for Tuberculosis (TB) Screening in Kalutara District Sri Lanka

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ABSTRACT

Background: Annually, nearly 17,000 of TB cases are estimated in Sri Lanka but only around 11,000 new cases are reported. The Ministry of health (MOH) states that there is significant underutilization of MCs in island wide. Availability of resources at MC such as Public Health laboratory Technicians (PHLTS), guidelines, laboratory equipment is important for the screening process enabling efficient utilization of MC.

Objectives: To assess the availability of resources at Microscopic Centers in Kalutara district.

Methods: A qualitative descriptive cross sectional study was carried out in MC during January 1st to 31st March of 2017. All the staff members(n=10) involved TB screening such as Regional Epidemiologist(RE), District Tuberculosis Control Officer(DTCO), Medical Officer of Planning(MOP), Public Health Laboratory Technicians(PHLT), Tuberculosis Assistants(TBA) were taken to study population. Key informant interviews were held using a semi structured interviewer guide. On analyzing the qualitative data, Grounded theory along with constant comparative methodology was followed.

Results: Of the participants, Mean age is 43.6 years (SD=7.94) and 60%, were females (n=6). All participants (n=10) emphasized that staff is not adequate. Of the participants 70% (n=7) stated that training is not adequate. Majority of staff said that the provision of WHO recommended safety goggles (90%, n=9), N95 or FFP2 equivalent safety masks (100%, n=10) and provision of disinfectants (70%, n=7) were inadequate. None of the MCs had an established cough area while MC at Panadura was very unsafe.

Conclusions & Recommendations: The PHLTs and TBAs are inadequate and their In-service training programs (ISP) were not adequately conducted. Annual ISP for MC staff and long term recruitment plan is recommended. WHO recommended deficient essential resources are recommended to purchase through annual estimates of regional Directorate of Health services (RDHS) or National Program for Tuberculosis and Chest Diseases (NPTCCD). Pandura MC needs to shift to safer place to minimize vulnerability.

Keywords: Microscopic Centers, Resource availability, Underutilization, Tuberculosis

BACKGROUND

Tuberculosis (TB) still remains one of the top 10 leading causes of death worldwide and in Sri Lanka 6000 new cases are reported annually. The WHO declared as "Global emergency in TB" in 1993. The WHO TB control strategies initially evolved as "Stop TB strategy" in post 2015 period, turned to "End TB epidemic by year 2035". The targets were set in reducing TB deaths by 95% and reduce incidence by 90%. The national priorities were set for early detection of new TB cases, appropriate management of cases with quality assured drugs and curing all patients with patient centered care.[1] In Sri Lanka, the percentages of referrals of TB suspects are

remarkably low and Microscopic Centers (MC) are underutilized in spite of repeated awareness campaigns done by National Program for Tuberculosis and Chest Diseases(NPTCCD).[2] Along with poor contact tracing and inadequate detection of new cases have been identified as a major weakness in TB control program in Sri Lanka.[3] The objective of this qualitative cross sectional study is to assess the availability of resources at MC in Kalutara district Sri Lanka in order to find any resource gap leading to possible underutilization of MC.

Microscopic centres in Sri Lanka Microscopic laboratories at district chest clinics, MC at peripheral levels in Sri Lanka have been established in order to examine sputum smear for Acid fast bacilli (AFB) to make efficient diagnosis of TB. Apart from that MCs examine blood films for malaria as well as microfilaria. Once patient is referred to MC, a spot sample is advised to the patient and then advised to obtain one early morning and a spot sample at home and bring in next day. Apart from the screening, MCs play a remarkable service during the time of follow up of diagnosed TB patients. Sputum collection is done in a safe cough area where all MCs ideally should have one. But due to financial constrains the implementation of cough areas in all MC is delayed island wide. Sputum collection is never advised in enclosed areas like toilets, within the laboratory premises, waiting rooms and reception rooms. Ideal cough area must be exposed to good sun light, covered with shelter, ventilated through and through and shouldn't be congested with people.[4]

Resource s availability in Sri Lanka to screen PTB suspects TB microscopic network of Sri Lanka is comprised of three levels of laboratories. At national level National TB reference Laboratory (NTRL), at district level microscopic laboratories and peripherally located MC. NTRL provide all necessary technical guidance to the network of laboratories. All district chest clinic laboratories (DCCL) except Colombo and Gampaha are run under administrative purview of provincial health authorities and technical guidance of NTRL and NPTCCD. DCCL provides reagents, other laboratory requirements and maintenance of equipment to peripheral MC. The NTRL primarily formulates laboratory policies, guidelines and manuals for the network of laboratories. Further, human resource development such as training for laboratory technicians, capacity building and coordination of laboratory network are few of their major functions.[5]

The method of choice for sputum smear is Ziehl- Neelsen technique under light microscopic examination. MC is provided light microscopes by NTRL with coordination of DCCL. But fluorescent dye technique (Auramine O, Auramine-rhodamine) visualizing the slide field under fluorescent microscopes are less time consuming and better accurate.[5]

A Cross sectional study was done in Cameron during August to December in 2009 using 300 sputum samples taken from PTB suspects and patients receiving treatment for PTB to compare Ziehl-Neelsen technique and fluorescent technique. Two slides were prepared from same specimen and Fluorescent technique was compared with Ziehl-Neelsen technique.[6] 6% false negative samples with Ziehl-Neelsen technique became positive with fluorescent technique which showed a significance of $P< 0.001$. Smear positivity for acid-fast bacilli with the fluorescent method was 33.3% and it was higher than with the Ziehl-Neelsen method which was 27.7% which showed borderline significance of $p=0.06$. Simultaneously this study showed that auramine-rhodamine fluorescent staining method reduces the staining time approximately by 50% without losing staining quality. But in Sri Lankan setup, Fluorescence Microscope and the reagents are not provided to MCs as the initial cost is high.

TB microscopic laboratory standards were endorsed by WHO, Center for Chest Disease Control in United States (US CDC)

and US National Institute of Health (NIH).[7] According to recommendations the laboratory must be ventilated with laminar-flow which blows high efficiency particulate air over the working area. The safety masks must be N95, FFP2, or equivalent respirators. Also the labs should be equipped with Lab gowns, Disposable gloves, Biohazard bags, Tuberculocidal disinfectants (hypochlorite and phenol based disinfectants), Waste receptacles, Centrifuge with biosafety canisters/lids, Autoclave, warmers to prepare Heat-fix slides, Autoclave tape and Spore test for autoclave.[7]

METHODOLOGY

It's a qualitative type of descriptive cross sectional study carried out from 01.04.2017 to 15.05.2017. The interviews were conducted at the working premises of staff individuals. District Tuberculosis Chest Officer (DTCO), Medical Officer of Planning (MOP), Regional Epidemiologist (RE) were interviewed at RDHS office Kalutara and Public health laboratory technicians(PHLT) and TB assistants(TBA) were interviewed at the MC premises at 7 hospitals; District chest clinic Kalutara(CCK), Base hospitals Horana, Panadura, District hospitals Mathugama, Beruwala, Ingiriya and Bulathsinhala. All these MCs and DCCL are functioned under the administration and supervision of DTCO and the RDHS.

Study population All the staff members directly involved in activities of MC were taken for qualitative study. The RE is involved closely with MC as TB is one of major notifiable diseases that he is engaged with. The DTCO is attached to RDHS office, does direct supervision of MC who is aware of its resource availability. The MOP is involved in planning the distribution of furniture and many equipment to MC. PHLT and TBA examine sputum smear at the MC to make the diagnosis of TB.

Sample size All officers mentioned under study population (n=10) were interviewed.

Semi-structured questionnaire A semi structured questionnaire was used to assess the resource availability at MC. The open ended questions were based on the topics of adequacy of reagents, technical guidelines by NTRL, adequacy of PHLTs, in-service training programs, personal protective equipment, safe cough areas, disinfectants, sputum collection containers , tubes, slides, wooden sticks, wire loop, burners and microscopes, stationaries and adequacy of furniture. It was developed by the PI with the guidance of the supervisor. Expert opinion was taken from the Chest Physician and DTCO. Literature in WHO TB laboratory guidelines [8] and NPTCCD TB laboratory manuals[9] were used during the process of developing the semi structured questionnaire in order to assure content validity. The structure was flexible to accommodate variety of beliefs and opinions in relation to subjects explored.

Data collection Single mock interview was carried out with a PHLT as a pre-test of the semi structured questionnaire at Base Hospital Homaga main Colombo district to check the feasibility, comprehensibility and appropriateness of the content.

Prior appointments were made with participants before conducting interviews. Informed written consent was obtained after explaining the procedure, purpose of the study and the interview before proceeding in. Interview was carried out in private, and confidentiality was assured. It took 30-45 minutes time to complete an interview session, conducted PI. Some individuals were interviewed more than once. The data collection was continued till the major categories were fully saturated. Interviews were audio taped and transcribed later for analysis.

Quality of data Triangulation technique was used during the interview. It involves multiple perspectives to interpret single set of factors in order to increase the credibility of the data.[10] The PI himself carefully held the interviews and analyzed data with much awareness about reflexivity

and interjecting personal bias on negative cases.

Data analysis The researcher manually analyzed transcribed data and field notes along with the questionnaire on the same day the interview was held. On analyzing the qualitative data, conversion of transcribed data to written notes and re-reading were done to categorize the data in to researcher's own topics formulated. Grounded theory along with constant comparative methodology [11] was followed in analyzing the collected qualitative data. The steps followed were: data refining, categorizing, comparing the incidents applicable to each category, integrating the categories and their properties, then delimiting the theory.

RESULTS

Characteristics of the participants Of the total participants, 60%, were females (n=6). Lowest educational qualification was G.C.E O/L and the highest was Bachelor of Medicine and Bachelor of Surgery (MBBS). Mean age is 43.6 years (SD=7.94) and mode is 37 years (IQR=9.75).

The statements gathered during interviews, were coded and grouped according to following themes and sub themes. The statements were categorized as opinions on adequacy of human resources improvement such as adequacy staff at MC, adequacy of training and availability of guidelines, opinions on adequacy of physical resources such as adequacy of equipment, adequacy of consumables, adequacy of furniture, Opinion on adequacy of safe cough areas and suggestions on improvements of MC.

Opinion on adequacy of human resources improvement: Adequacy staff at MC All participants (n=10) emphasized that PHLT and TBA are not adequate to cover the duties at Kalutara district. Of them 70% (n=7) stated that at least two PHLT or TBA were needed for the already closed MC at Mathugama and currently functioning MC at Bulathsinhala which was operated through cover up duty by TBA at CCK.

Adequacy of Training Of the participants 70% (n=7) stated that training is not adequate while remaining participants (30%, n=3) stated that training is adequate. One 37 years old female TBA stated that

"I have experience as a TBA for last 9 years. Initially 2 yearly in-service training programs were held. I have attended two such programs. There was no training during last 4-5 years"

Another 37 years old female PHLT stated that

"From 2006 to 2010 in-service programs were held annually. After 2010 none of the PHLTs or TBAs was given any training. I think the reason is insufficient funds. I think it should be held at least annually"

Availability of guidelines 80% (n=8) of the participants stated that guidelines were adequately provided by the NTRL and then by the CCK to MC. Furthermore, DTCO and CCK-PHLT update the peripheral staff regularly at monthly supervisory visits. Other two participants were not sure about availability of any guidelines.

Opinion on adequacy of physical resources

Adequacy of equipment All participants (n=10) stated that microscopes and slides were adequately and timely provided by the NTRL via the CCK to the MCs. For 70% (n=7) coats are provided by RDHS, for 10% (n=1) each it was provided by the NTRL and self-provided while one participant was not aware about the source. 90% (n=9) stated that Goggles, Burners, wire loops were never provided by the NTRL while one participant was not aware about the source of their origin. They further said that, a simple burner with cotton swab and spirit is used instead of the burner and eakles are self-provided domestically instead of wire loops.

One PHLT stated in her statement,

"We use eakles instead of wire loops and spirit stained swab as the burner. It's easy to use too. We never received goggles, burners and wire loops by CCK. I feel goggles are very important as we are handling body fluids which may be infected with HIV"

*Adequacy of consumables*90% (n=9) of the participants stated that reagents, sputum cups and stationeries were adequately supplied by the NTRL and then by DCC to MCs while one participant didn't express any opinion. 70% (n=7) said that disinfectants (Alcohol, Fenol) are never provided by DCC, 20% (n=2) said that they receive it from particular hospital, while one participant was not aware about the source. Everybody agreed that cleaning agent-Britol, gloves, masks & soap -provided by the hospital adequately.

Adequacy of furniture All participants (n=10) said that furniture is adequately supplied by same hospital or RDHS and repairs were done by RDHS timely.

Opinion on adequacy of safe cough areas Majority of participants at MCs (90%, n=9) mentioned that they have enough space within the hospital for a safe cough area. According to the participants, only CCK has an established safe cough area and MC at Panadura has a very unsafe cough area near clinics and toilets. It was emphasized that authorities pay poor attention on this issue in spite of repeated alerts.

Suggestions on improvements All participants (n=10) suggested that the staff of MCs should be increased. All (100% n=3) TBAs stated that they should be recruited to permanent service. 30% (n=3) of the participants said that training programs should be held at least annually. One participant said that goggles must be provided as they work with body fluids which may be infected with HIV. One PHLT at CCK said it's good to have chemical balance and distilled water for reagent preparation at CCK. All participants (n=10) suggested to have separate established cough area in all MCs. Nobody was aware about Fluorescence Microscope with Fluorescence staining technique which has comparatively higher sensitivity and less time consuming in screening.

DISCUSSION

Opinions on adequacy of human resources improvement The opinion of all the staff is that the PHLT and TBA are not adequate in Kalutara district. Mathugama MC is closed due to unavailability of a single PHLT or TBA. Bulathsinhala MC is functioning only 2 days per a week by covering up duty by one TBA from CC. There was no formal in-service-training conducted by NPTCCD at least during last 4 years and this may be due to lack of motivation of authorities and insufficient funds.

Opinions on adequacy of physical resources The minimal WHO recommended equipment such as safety goggles, N95 or FFP2 equivalent masks and recommended disinfectants have not been provided adequately. Cleaning agents like Britol which is a commercial product, routinely used for toilet cleaning is used at MC whereas standard Tuberculocidal disinfectants should be provided for the purpose. Also none of the MC or CCK has the lamina flow air circulating system recommended by the WHO. In addition to that all MC have internal fans which make the staff more vulnerable for infections.

Opinion on adequacy of safe cough area Requirement of a cough area to all MCs can be temporarily disregarded on financial constraints because of availability of enough safer spaces except Panadura, But Panadura MC located in a highly congested area where the cough area is adjacent to the toilets and clinic premises.

Suggestions on improvements Staff recruitment was emphasized by most of individuals while TBA stressed that, they should be absorbed to permanent staff. Earlier PHLTs were recruited as Microscopists for investigating microfilaria, malaria and TB, however the emphasis on continuous recruitment have declined gradually with elimination of Malaria and Filaria in Sri Lanka.[12] Although light microscopes are provided adequately the fluorescent microscopes is more sensitive and less time consuming for staining[6] which have been poorly emphasized so far

in TB program in Sri Lanka due to high initial cost.

CONCLUSIONS AND RECOMMENDATIONS

There was not enough number of PHLT and TBA in Kalutara district to be appointed at MC at Mathugama and Bulathsinhala. There is a need of arrangement of cover up duties to them till receiving a permanent staff member. A long term plan for recruiting trained permanent PHLT to all MC is a need. In-service training programs on PHLT and TBA were not conducted adequately and annual training programs can be incorporated for them into NPTCCD annual action plans. WHO recommended safety goggles, N95, FFP2 equivalent safety masks were not provided by NTRL. Provision of Hypochlorides and Fenol based disinfectants were not adequate. Chemical balance was not available and distilled water for reagents preparation was not adequate. Actions should be taken to purchase WHO recommended possible equipment and consumables through capital or recurrent budget, including them to annual estimates of RDHS or NPTCCD such as safety goggles, chemical balance, distilled water manufacturing equipment, N95 masks and disinfectants with recommended strengths. None of the MC or CCK had lamina flow air circulating system. None of the MCs have safe cough areas (except CCK) and MC- Panadura and was more vulnerable to spread infections as cough area is amidst of clinics and public toilets. As WHO recommended lamina flow is expensive, the steps should be taken to build exos fans instead of internal fans to avoid staff more vulnerable for infection within MC. Steps should be taken to put up cough areas at each MC in order to avoid infections and maintain privacy as TB is associated with high social stigma. Also immediate actions should be taken to shift Pandura MC to safer place with safe cough area.

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