TUBERCULOSIS INFECTION CONTROL POLICY AND ITS IMPLEMENTATION IN HIGH BURDEN DOTS FACILITIES IN IBADAN: A QUALITATIVE EXPLORATION

Kamiludeen Titilade Alebiosu [a] (kameel.alebiosu@gmail.com)
Oluwaseun Oladapo Akinyemi,[a*] (ooakinyemi@comui.edu.ng, seunakinyemi@hotmail.com)

[a] *Department of Health Policy and Management, College of Medicine, University of Ibadan, Ibadan, Nigeria*

***Corresponding author:** Dr Oluwaseun O. Akinyemi
Department of Health Policy and Management,
College of Medicine, University of Ibadan, Ibadan, Nigeria
+234 803 502 0136

ABSTRACT

Background: Following the growing public health problem of Tuberculosis (TB), the TB Infection Control Policy and Guidelines was published in 2009 to reduce the transmission of this disease to healthcare workers and patients. This study assessed the TB policy and the factors influencing its implementation in Ibadan, Oyo State Nigeria.

Methods: This study was conducted in five of the urban Local Government Areas in Ibadan, Oyo State where 10 Directly Observed Treatment Services (DOTS) centres with high TB burdens were selected. Eighteen key informant interviews were conducted with purposively sampled DOTS Officers, Tuberculosis and Leprosy Control Program Local Government Supervisors (TBLS) and members of the State TB Control Program.

Result: Only few of the facilities assessed had a written facility-specific infection control plan (that includes TB infection control) and a fifth of the facilities had designated persons (and committees in larger facilities) responsible for implementing TBIC policy. There was a general shortfall in the implementation of administrative control measures except for compliance to triaging rules as revealed by very poor compliance to most details of this aspect of the TBIC policy in most of the centres visited. Poor funding, inadequate support from the government at all levels, shortage of personnel, inadequate supply of Personal Protective Equipment were all identified as the major challenges faced in implementing the TBIC policy.

Conclusion: Awareness on the content as well as the level of implementation of the policy still fall short of the WHO recommendation. Policy makers and implementers need to strengthen the administrative control measures which has shown to be very effective and efficient in curbing the spread of the disease.

Keywords: Tuberculosis, Infection control, Policy implementation, Directly observed treatment services, Personal protective equipment

Background

Tuberculosis (TB), an ancient infectious disease caused by *Mycobacterium tuberculosis,* is the leading cause of death due to an infectious agent globally.[1] TB is both preventable and treatable[2] and it is carried in airborne particles called droplet nuclei that can be generated when persons who have pulmonary or laryngeal TB disease cough, sneeze, shout, or sing.[2] Globally, there are more cases of TB nowadays than in previous era of human history and the World Health Organization records an average of 9 million new TB cases annually and about 5,000 TB deaths daily.[3] It is projected that by the year 2050, the annual death rate from TB will exceed 5 million a year.[3] TB is a major public health problem in Nigeria and it was declared a national emergency in 2001.[4] Following the Abuja Declaration in 2001, Directly Observed Therapy Short course (DOTS) activities have been scaled up across Nigeria. In spite of the documented effectiveness of DOTS in the Nigerian context, Nigeria has the tenth largest burden of TB cases in the world.[5]

In 2009 the World Health Organization (WHO) issued a TB Infection Control (TBIC) policy including administrative, environmental and personal protection measures as a means to battle the increasing incidence of institutional settings, including health care facilities being a source of TB Infection.[6] This infection control guideline was made universal and applicable even in resource-poor setting with emphasis on the administrative component of the policy as it the most easy to perform especially for poor resource settings where finance is a challenge.[7]

National Tuberculosis and Leprosy Control Program (NTBLCP), the organization in charge of TB and Leprosy in Nigeria, and other stakeholders developed guidelines for the country based on the WHO recommendations, for the control of TB infection in health care settings.[8] The World Health Organization (WHO) recommends a few infection control measures in health facilities that have been further classified into three: managerial and administrative measures, environmental measures and personal protective equipment. The WHO recommends that all health facilities caring for TB patients or persons suspected of having TB implement these measures. These measures have been found to minimize the transmission of TB in health facilities. [9, 10]

Managerial and administrative control measures include the activities undertaken to set up and ensure the implementation of all other measures at the facility level. The managerial activities should ensure political commitment and leadership, identify and strengthen local coordinating bodies for TB infection control, and develop a facility plan (including human resources, and policies) for implementation.[11] Environmental control measures include methods to reduce the concentration of infectious respiratory aerosols (i.e. droplet nuclei) in the air, and methods to control the direction of infectious air. The choice of environmental controls is closely linked to building design, construction, renovation and use, which in turn must be tailored to local climatic and socioeconomic conditions.[6 12] Respiratory measures including personal protective equipment (PPE) are particularly vital in situations where there is an increased risk of transmission. The use of particulate respirators may afford health workers additional protection from TB through the use of particulate respirators that meet or exceed international standards.[6]

TB transmission frequently occurs before an accurate diagnosis is made, therefore it is the responsibility of health-care workers, particularly managers, to ensure the implementation of

appropriate TB infection control measures in all high risk settings so as to ensure that "health care facilities become known as places of healing and safety".[13] Studies pertaining to low- and middle-income settings have identified some factors influencing the implementation of TBIC policy which include capacity and resources to correctly interpret, apply and manage policy directives in local contexts [14] and inadequate provisions of PPE.[15]

Also, poor practices regarding administering TB infection controls have been reported as a factor influencing the implementation of TBIC policy.[16] In a South African study, Malangua and colleagues reported that less than half of health facilities surveyed adhered to TB infection control measures.[15] TB-related training and knowledge are identified factors that may co-exist to influence the implementation of TBIC policy among healthcare workers. TB-related training was found to be a predictor of good practices and implementation of TBIC policy and positive correlations were established between knowledge and implementation of TBIC policy.[17] There exists paucity of data linking health workers' practices and implementation of TBIC policy. Thus it is important to not only train but also support healthcare workers on skills to strengthen the implementation of TB infection control strategies.[18] This study explored the tuberculosis infection control policy and factors influencing its implementation in Ibadan, Oyo State, Nigeria.

Methods

Study design and setting

This study was a cross-sectional qualitative study which used key informant interview (KIIs), in-depth interviews (IDIs) and observational checklist. The research was carried out at DOTS sites in Ibadan that have high burden of TB patients which also fall among the top 20 high burden sites in Oyo state and are located within the urban Local Government Areas (LGAs) in Ibadan. Ibadan consists of 11 LGAs for governance and administrative purposes. Five of the LGAs are located in the metropolitan core of the city, while the remaining six are either predominantly peri-urban or rural settlements. The State has 1729 health facilities disaggregated into 712 Primary Health Centres (PHCs), 46 secondary health facilities, 3 tertiary health centres and 968 registered private health facilities. Out of these facilities, 254 are the ones providing DOTS services in the state - 186 PHCs, 32 Secondary health facilities, the 3 tertiary health facilities and 33 private facilities [19]

Sampling and Participants

Five (urban) LGAs in Ibadan, Oyo state were selected for this study. These study sites were purposively selected because they have high burden of TB patients. Eighteen participants were recruited through purposive sampling. These comprised members of the State TB Program which include the Monitoring and Evaluation (M&E) Officer, the Logistics Officer, the Drug Resistant -TB Focal Person and the Laboratory Focal person. Also, the head of TBIC committee at the facility where the committee was present, TB Local Government Supervisors (TBLS) in the five LGAs were recruited (see Table 1).

Table 1: Interview type and sociodemographic characteristics of respondents (N=18)

Variable	n	%
Type of interview		
KII	11	61.1
IDI	7	38.9
Professional category		
Doctor	4	22.2
Nurse	3	16.7
Pharmacist	1	5.6
CHO	8	44.4
CHEW	2	11.1
Position		
SLO	2	11.1
TBCO	4	22.2
TBLS	6	33.2
DRTB	3	16.7
INFCHAIR	1	5.6
M&E	1	5.6
DOTS Officer	1	5.6
Years of experience		
<10	7	38.9
≥10	11	61.1
Mean years of experience	9.8±6.5	

CHO-community health officer; CHEW-community health extension worker; SLO-state logistics officer; TBCO- TB program control officer; INFCHAIR-infection committee chairman; M&E- Monitoring and Evaluation officer; TBLS- TB local government supervisors; DRTB- Drug resistant TB focal person

Data collection and analysis

A total of 11 KIIs and seven IDIs were conducted with the study participants to explore the infection control policy and the factors influencing its implementation. Interviews were conducted in English, audio recorded and transcribed. KIIs and IDIs were conducted with the aid of interview guides. The KII explored measures of control, awareness and training of personnel and factors influencing implementation. IDIs were conducted with the personnel to evaluate TB infection control policy implementation.

A broad coding framework was developed based on the research questions. All transcripts were analysed with NVIVO (version 11) software using the thematic framework analysis approach. As themes emerged, they were indexed and compared with themes from subsequent interviews until a sense of attainment of saturation, where no new information was being obtained,[20] was achieved.

Results

Availability of infection control committees

Infection control committees were found only in secondary and tertiary healthcare facilities and none at the primary healthcare facilities. Among the facilities with the committees, meetings were not held regularly and factors responsible for this include bureaucracy bottlenecks, poor funding, and inadequate number of personnel and unmet needs of the committee leading to less commitment

> *There is a problem on this issue. Not every facility has a functioning infection control policy. Some even say they have forgotten that there should be a committee. Only a few facilities still have a functioning*

committee. Jericho (state hospital) has a standing committee. (KII, Nurse, Male)

At the state hospital in Jericho there is an infection control committee because TB is not the only infectious disease. It is a general committee at the state hospital but the state program has none currently. It was dissolved because of shortage of funds. (KII, Doctor, Male)

Training in infection control

Training is an important aspect of the infection control policy as it equips health care workers with knowledge and skills to go about their activities, majority of respondents received some form of training for infection control, some external training and others learnt on the job.

Yes…infection control is always part of the trainings whenever general healthcare workers are being trained on anything related to TB or even HIV. And even when healthcare workers were being trained on programmatic management of MDR TB, infection control is always part of it. (KII, Doctor, Male)

At the state level, there are so many trainings that have been done at various facilities belonging to the state. We have trained them on infection control and each facility has a committee and a plan signed by the facility manager and the WHO representative that attended the training with them. (KII, M&E Officer, Male)

Management of HIV and TB co-infection

HIV and TB co-infection was another component of the administrative part of the TBIC policy discussed by respondents. TB Patients are screened for HIV and linked up with ART clinic if tested positive and patients are followed up to ensure that they adhere to the treatment regime

There is a policy that all TB patients must be screened for HIV. With this they would be able to identify the dually infected. The patient is given priority. HIV patients are detected in two places at both HIV centres and at TB clinics. When they see them like that they are attended to in time. (KII, Doctor, Male)

INH prophylaxis is available in the program. First thing they do is screening of coughing HIV patients by Gene Expert for early detection of TB. Also, TB presumptive patients are all tested for HIV and if positive they are referred to ART clinics. The test for HIV at the TB center is done even when the person is not positive for TB. (KII, CHO, Female)

Environmental measures in infection control

The second component of the TBIC policy is at the environmental level and this includes measures put in place to ensure that facilities are suitable for use and protect against the spread of TB infection. Environmental measures that was put in place and identified by the respondents include DOTS sites that are well aerated which allowed for proper ventilation, separate area for sputum collection, and use of disinfectants for cleaning of DOTS centres.

Most of the DOT centres are open and well ventilated to give room for diffusion. (KII, CHO, Female)

There is a box meant for sputum collection; from time to time, the box is decontaminated and they are put outside for sun to heat it and we also sprinkle JIK

and Morigard on it peradventure there was a spill over of the sputum on them. (IDI, Nurse, Female)

Personal protective equipment TBIC implementation

Respiratory measures are measures to curb the spread of infection among patients and staff. These include the use of gloves, face mask, N95 respirators, covering of mouth with handkerchiefs, hand washing, use of hand sanitizers.

For drug susceptible (TB), it is the health worker that uses the face mask while the patients use their handkerchief. But for MDR (TB) both the patients and healthcare worker would use the face mask. (IDI, CHO, Female)

We only have N95 respirators for MDR (TB) patients. It was available when we were treating MDR patients when they were being treated with injectables but since the adoption of the use of oral medications for MDR at the DOT centres, the supply of the N95 has stopped. (IDI, CHEW, Female)

Knowledge and practice of DOTS Officers towards TBIC policy implementation

Participants regarded infection control measures as the various actions taken to prevent the incidence of TB
among staff in facilities. Respondents identified various things done to prevent the spread of Tuberculosis among staff and patients and are highlighted as follows

Awareness of TBIC Policy

There were mixed answers about the awareness of the TBIC policy as not all respondents were aware about the presence of an infection control policy in the program.

Yes, there is a written policy. There is a unit in charge of it and they go about ensuring its implementation. And the committee does monitoring. (IDI, Nurse, Female)

No. If there is anything to correct on infection control, I used to tell them but there is no specific document. (IDI, CHO, Female)

Keeping a safe distance

At the different DOTS Centres, different sitting arrangements was observed when HCW were attending to patients. The respondents also gave insight on how the sitting arrangements were done and they explained it was done in such a way that avoided close face-to-face contact with patients. Open spaces were used, clinics with windows open, sitting arrangements were perpendicular while the flow of air is monitored so the HCW will be backing the flow.

Patients are not allowed to face us. The patients sit perpendicular to us. (IDI, Nurse, Female)

I site my seat in the opposite direction of the wind but most time I attend to them at the shield outside. I don't allow them to come into the office. (IDI, CHO, Male)

Eating a Balanced Diet

Proper diet and consumption of nutritious food was one of the practices the DOTS Officers mentioned

on how they were able to implement the TBIC policy.

> *We eat good food to build our immunity. We know that everyone has a latent level of TB in their system and their susceptibility to the disease is influenced by the level of immunity. The higher the immunity the less chances one has of coming down with TB.* (IDI, CHO, Female)

> *What we were taught then was to ensure Good immunity through good diet to boost our immunity. We usually encourage ourselves during our DOTS workers' meeting, to ensure adequate diet at all times.* (IDI, CHO, Male)

Staying Informed

The respondents opined that their knowledge about the disease and its spread empowered them to take necessary precautions against being infected with the disease

> *Yes. I worked at the facility level for years and I didn't even come down with cough talk less of TB. This is so because we have measures in place to protect ourselves while on the job. It is very important to take care of yourself while also trying to take care of the patients. Your exposure and knowledge would help.* (KII, M&E Officer, Male)

> *As the saying goes 'knowledge is power'. The Knowledge of healthcare workers about TB and its spread enables people to protect themselves.* (IDI, CHO, Female).

Personal hygiene in TBIC policy implementation

Personal hygiene measures like washing of hands with soap and water, the use of hand sanitizers were identified by the respondents as part of their practice in TBIC policy implementation.

> *We use nose cover to cover our mouth and nose, we also use Izal, JIK to wash hands and clean surroundings, we keep presumptive patients distance away and we ensure the use of handkerchief by all presumptive patients whenever they want to cough…* (IDI, CHO, Male)
>
> *Using of nose mask, washing of hand within Dettol, IZY AND JIK, wearing of gloves and not allowing the patients to produce sputum in the office.* (IDI, CHEW, Male)

> *We use hand gloves, hand sanitizers, nose mask, antiseptic lotion for cleaning the ward, apron, wash hand basin for hand washing and we all know how to use them.* (IDI, Nurse, Female)

Factors influencing the implementation of TBIC policy implementation

Several factors affect the implementation of TBIC based on the respondents, while some of them makes the implementation more challenging, there are some factors that aids and ease the implementation of TBIC Policy

Factors that affect TBIC Implementation

Respondents identified several factors affecting the implementation of the infection control policy

including, funding, education level, poor supply of commodities, poor monitoring of activities and inadequate support from the government.

Level of education

Respondents had varying views on the role of education in practicing infection control, while some believed that higher qualification implies better compliance, some others were of the opinion that knowledge is what really counts, not necessarily the academic qualification

> *No doubt, level of education would play its role because if I get infected the first person that would suffer for it is me, therefore even if I am not being supported or encouraged I have a responsibility to make sure that I am not infected no matter what any other person does or is not doing.* (KII, Pharmacist, Male)

> *Level of education does not influence it. Once someone can communicate effectively, he or she can comply. Compliance to these infection control measures is not dependent on education.* (IDI, CHO, Female)

Poor supply of commodities

According to respondents, commodities needed like PPEs and disinfectants to successfully implement the TBIC policy are always in short supply.

> *In the time past when the programme was still vertical, we had disinfectants and other PPEs were readily available but since the government took over, the supply had not been forthcoming.* (IDI, CHEW, Male)

> *We are supposed to have N95 respirator but presently even while attending to MDR patients they are not available. Supply had never been made for N95 respirator for attending to MDR patients.* (IDI, CHO, Female)

Poor funding

The study participants were of the opinion that funding for infection control activities has been poor as highlighted by respondents. Infection control have not been given priority in program management and government as cited dwindling resources as an impediment to providing financial support and HCWs have resorted to self-funding as a stopgap measure.

> *The funders have tried their best. They do not usually provide most of the PPEs except N95.The funders only provide N95 for treating patients at the intensive phase of MDR TB because it takes a long period to treat and costs more money to be treated… Other PPEs are neither supplied by the government nor funders. Therefore, we have healthcare workers who have to provide PPEs for themselves.* (IDI, CHO, Female)

> *There was a step-down with the HOD and an official report written but no action has been put in place till date because of funds shortage… No support from government. Government has not focused on infection control… For example, the 200 thousand naira that is supposed to be released by the LGA for TB control is not forthcoming. Even there was no funding for world TB day.* (IDI, CHO, Female)

Poor monitoring and administrative laxity

Inconsistency or poor monitoring hinders the success of implementation of infection control activities.

> *When we started those committees, what is expected of the facility emanated from the state control office, coordination was from the state office. We go to facilities to ensure that they put in place the infection control policy. When we were doing it that way it was effective but because there was no more monitoring, they all relaxed. Because if there is monitoring everybody would be geared up. That is why they all relaxed. Monitoring of facilities is very, very important. If there is a body monitoring each facility, I believe each facility would be doing it. The issue of monitoring is a factor that needs to be addressed. If there is no body doing it, we are all human beings everybody could forget. And this is responsible for TB amongst healthcare workers in the non-TB setup.* (KII, Nurse, Male)

Structural Factors

Structural factors including the design, space, ambience, lighting and water facilities are important considerations in successful implementation of infection control activities as identified by respondents. Respondents also noted the need for involving stakeholders before structures are put in place to ensure that the facility is fully maximized as well as educating other health care workers.

> *But here are some that has to with the structure of the hospital. For example, when TB infection control was not considered when building a facility, so for that nobody can change the structure. May be what we can do is to do rearrangement and where they don't agree with you to do rearrangement, there is nothing you can do about it. When a facility is already in existence, it becomes difficult to remodel the structure to suit the TB program standard for infection control.* (KII, Doctor, Male)

> *And again, people that design the hospital, they need to involve those to work at the facility which is not currently being done. If you involve us, we will tell them what we need rather than just constructing a building without involving those that would work them. So, they build facilities that are not suitable for use. For example, the current building at Jericho hospital, the state coordinator should have been consulted to ensure that the facility is utilized.* (KII, M&E Officer, Male)

> *In 2015, in Ibadan, infection control and the need to establish a team for infection control with stakeholders' participation was discussed. The specification of window construction was discussed. Also, the velocity of air required to control spread. The need to educate other health workers.* (IDI, Nurse, Female)

Discussion

In this study, we collected qualitative data on tuberculosis infection control policy in Ibadan, Oyo state and also examined factors influencing its implementation. This study revealed that few of the facilities assessed had a written facility-specific infection control plan (that includes TB infection control and a fifth of the facilities have

designated person (and committee in larger facilities) responsible for implementing TBIC Policy in the facility and this agrees with the findings of Ekuma and Oridota[21] who reported in their study carried out in Lagos that less than a quarter of the health facilities studied admitted to not having a documented TB policy. Only a third of the facilities had a designated TBIC focal persons that have undergone TBIC training; however, majority of the staff had undergone TB-related training.

There was a general shortfall in the implementation of administrative control measures except for compliance to triaging rules and this complied with the findings of Malangu and Mngomezulu[15] done in South Africa which also discovered that nine of the 10 administrative control measures which fall under the responsibilities of institutional managers were not complied with.

There was however a higher level of implementation of environmental measures as compared with the administrative and managerial measures as revealed by all the facilities having a waiting area that was well ventilated with clear display of messages on cough hygiene in all areas frequented by patients. This however is not in consonance with the findings of Tenna and colleagues[22] in Ethiopia where 76% of the facilities cited lack of adequate infrastructure to isolate suspected/known TB patients. There was also a big difference between this finding and those of Buregyeya *et al*[23] in Uganda which reported that 22 out of 50 facilities did not have adequate ventilated waiting areas based on the proportion of the window to floor area and patients were observed to crowd in narrow and poorly ventilated corridors in outpatient departments.

For the personal protective component of the policy, less than half of the facilities had N95 respirators available for their staff and only a third of the facilities had supplies readily available for coughing patients (tissues, surgical masks and are being used). This is in consonance with the findings of Kanjee and colleagues[16] in a South African study which highlighted inconsistency in the supply and use of N95 respirators by HCWs when around patients regardless of their status, hence, negating the adherence to guidelines and policy implementation in such facilities. This further agrees with the findings of Tenna and colleagues[22] in a study conducted among Ethiopia HCWs which reported that only 8% supports that face masks were regularly available. However, this finding does not align with that of Sissolak *et al*[24] in a South African study in which most N95-respirators were reported to be available on most of wards with TB patients; this might be due to the study including facilities with patients on admission whereas this study involved TB out-patients only.

Awareness of the presence of TBIC policy is key because healthcare workers would only be able to implement the guidelines of a policy they are familiar with. Thus, awareness is the starting point to assess factors influencing the implementation of TBIC policy. A good number of the respondents were aware of the presence of a TB infection policy. Poor funding, inadequate support from the government at all levels, shortage of personnel, inadequate supply of PPE materials were all identified as the major challenges faced in implementing the TBIC policy. Studies have shown that funding and strength of medical infrastructures are critical to the realization of a policy's goals.[25, 26]

However, possible limitation of this study should be highlighted. Like any cross-sectional study, a claim of causality cannot be made. Also, since the assessment was done entirely from the respondents'

perspectives, subjectivity and social desirability bias were real risk. Nonetheless, these were mitigated by assurances of confidentiality of data and guaranteeing that no identifiers will be use while reporting the data. Despite these limitations, this study provides useful insights into factors influencing TBIC policy implementation in a resource-constrained setting like Ibadan.

Conclusion

The findings from this study has shown that although there is a national Tuberculosis Infection Control Policy, awareness of the content as well as the level of implementation still falls short of the WHO recommendation. Furthermore, a lot needs to put in place by local, state and federal governments to strengthen the administrative control measures which has shown to be very effective and efficient in curbing the spread of the disease. The provision of basic personal protective equipment such as N95 facemasks, gloves as well as continuous training of both new and experienced healthcare workers in the Tuberculosis infection control cannot be over emphasized.

Therefore, although the Tuberculosis Infection Control measures have been effective as evident by zero recorded cases of Tuberculosis infection amongst Tuberculosis program staff in Ibadan, Oyo state, more has to be done to strengthen the policy as well as make adjustment to loose ends especially as relating to funding and government support.

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Authors' contributions

This manuscript was conceived by KTA and OOA. Initial draft was developed by KTA and OOA. The final version of the manuscript was approved by KTA and OOA.

Ethical considerations

Ethical approval for this study was obtained from the University of Ibadan/University College Hospital (UI/UCH) Ethics Review Committee. Permission to conduct the interview was obtained from the Control Officer of the Oyo state Tuberculosis and Leprosy Control Program. In addition, written and signed informed consent was gotten from all participants of the study before going ahead to interview them. Participants were informed that their responses were anonymous and that their information will remain confidential and will not be shared past the research team without their consent.

Competing interests

The authors declare that they have no competing interests.

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