

## WHERE DOES THE WORLD STAND IN THE FIGHT AGAINST THE TUBERCULOSIS? 2015 UPDATE

Globally, in the fight against tuberculosis (TB), the year 2015 marks as an important milestone, with the world, achieving the Millennium Development Goal (MDG) - 6 pertaining to TB (halting and reversing the trend of the disease), shifting from MDGs to the next era of Sustainable Development Goals (SDGs), and from the Stop TB Strategy to the End TB Strategy.<sup>1</sup> The estimates released under the Global TB control 2015 report revealed that close to 9.6 million people were diagnosed with TB, of which 12% were HIV-positive.<sup>1</sup> Since the year 1990, a remarkable reduction in TB associated mortality of close to 50% has been achieved, accounting for more than 40 million lives saved worldwide.<sup>1,2</sup> Further, the 2015 targets pertaining to the reduction in the incidence, prevalence and mortality have been met in nine of the high-burden nations.<sup>2</sup> In addition, the global TB incidence has reduced by more than 18% since the beginning of the 20<sup>th</sup> century.<sup>1</sup> However, despite of all the achievements and the availability of an effective diagnostic / therapeutic option through which nearly all cases can be cured, TB still remains as one of the biggest public health threat globally.<sup>1-3</sup>

Nevertheless, 1.5 million individuals died from TB, including 0.4 million deaths among the TB-HIV co-infected in 2014, which is unacceptable as most of these deaths could have been easily prevented.<sup>2,4</sup> The health sector is falling significantly short in closing the detection gap as only 62.5% of the patients suffering from TB were notified to the health agencies.<sup>1</sup> Further, only 25.6% of the estimated multidrug-resistant TB patients were detected and reported which raises a serious question mark on the quality of care and the surveillance mechanism.<sup>2</sup> Even in the incidence aspect, almost 9.6 million new TB cases have

been diagnosed, which is much more than the estimates of the year 2013, when 9 million cases were diagnosed.<sup>1</sup> In addition, significant gaps have been identified in the funding aspect to ensure sound implementation of the existing prevention & control interventions.<sup>2</sup> Even though, a definitive improvement in the treatment initiation of multi drug resistant TB patients has been reported, nevertheless the global cure rate has been only 50%, which is a serious issue of public health concern.<sup>1</sup> However, if the international stakeholders really want to accomplish the proposed targets under SDGs (viz. minimize the TB deaths by 90% in comparison with the 2015 estimates, decrease incidence by 80% and to ensure that no household is burdened with enormous expenditure because of TB), a lot needs to be done.<sup>1,2</sup> There is an enormous need to bridge the gap on both diagnostic and treatment initiation fronts.<sup>4</sup> At the same time, quality research to facilitate the development of new diagnostics / drugs / vaccines, will also bring rich dividends to the TB prevention & control activities.<sup>2,5</sup> Most of the above gaps can be addressed, if there is a continuous monetary support towards the current strategies, so that primary health care can be strengthened.<sup>1,2</sup> To conclude, even though the battle against tuberculosis is paying off in terms of reduction in incidence, prevalence and mortality, if the policy makers really want to end the epidemic of TB, an up scaling of the existing services and financial investment in the research arena is the need of the hour.

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## INTERVENTIONS TO STRENGTHEN AIRBORNE INFECTION CONTROL IN HEALTHCARE ESTABLISHMENTSE

For decades together, owing to the exposure to different airborne pathogens, a wide range of outbreaks, epidemics, and pandemics of respiratory illnesses have been reported across the globe.<sup>1</sup> The majority of the respiratory infections are predominantly transmitted from one person to another through the airborne route via droplets exposing multiple susceptible individuals to the infection.<sup>2</sup>

The public health concern of airborne infections rises enormously in healthcare settings, especially due to the overburdened hospital, poor ventilation, and the presence of immune-suppressed patients in the premises of hospitals.<sup>1,2</sup> The World Health Organization and other international agencies have together released guidelines regarding airborne infection control in different settings.<sup>3</sup> The suggested measures include three broad categories, namely administrative, environmental and personal protective measures.<sup>3,4</sup>

The administrative control comprises of education & training of staff (viz. importance of infection control, educating about the precise work of healthcare staff); outpatient settings (like awareness activities for promoting cough etiquette by the patients, screening respiratory symptomatic & reducing their duration of stay in the hospital, modifications in the seating arrangement of doctor and patients based on the location of door & windows); and inpatient settings (such as minimizing hospitalization of patients, measures to reduce incidence of nosocomial infections, sensitizing patients and attendants about cough hygiene, segregating respiratory symptomatic to separate areas, maintain spacing by ward decompression, safe sputum collection, etc.).<sup>3,4</sup>

However, the environmental control measures mainly comprise of indoor patient segregation, bed spacing as per norms, maintaining adequate ventilation, and ensuring extra precaution in high risk wards of the hospital.<sup>4,5</sup> At the same time, by encouraging the use of personal protective equipments among the patients and healthcare staff, the subsequent risk of transmission can be significantly minimized.<sup>4</sup>

To conclude, implementation of standard airborne infection control measures in health care establishments requires a comprehensive package of interventions to minimize the incidence of airborne nosocomial infections.

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## EFFECTIVE IMPLEMENTATION OF CONTACT TRACING IN TUBERCULOSIS: PROS AND CONS

In the modern era, tuberculosis (TB) has been acknowledged as one of the leading causes of morbidity and mortality resulting from an infectious disease.<sup>1</sup> In-fact, the global estimates revealed that almost 9.6 million new cases of TB and 0.48 million cases of multi-drug resistant TB have been reported across the world in the year 2014.<sup>1</sup>

Globally, early establishment of the diagnosis and prompt treatment initiation has been recommended as the one of the key strategies in TB related control activities.<sup>1,2</sup> At the same time, especially in high prevalence settings, the “Directly Observed Treatment and short-course chemotherapy” approach has not paid rich dividends.<sup>3</sup> Thus, the strategy of “contact tracing” has been advocated to supplement the existing measures to reduce the burden of TB.<sup>4</sup> Even though, passive case finding has been adopted in heterogeneous settings for case detection owing to the resource constraints, contact tracing is a key intervention to ensure early detection of TB cases.<sup>3,5</sup>

Contact tracing has shown its effectiveness in augmenting case detection rates of pulmonary, extra-pulmonary & multi-drug resistant TB cases, initiation of prompt treatment, and in preventing reactivation of the latent cases.<sup>3,5</sup> However, some pre-requisites should be satisfied before implementation of contact tracing in a specific setting, namely its necessity based on the caseload in the area, identification of contacts & other attributes (like proximity to the index case, duration of exposure, extent of tracing, etc.), and tools/technique which will be adopted for its execution in the community.<sup>3,6</sup>

Further, its universal application is restricted owing to the time-consuming process; execution by the overburdened health care professionals; and inefficiencies in data collection, storage, and retrieval as it is conducted either by interviewing or using paper forms.<sup>6,7</sup> In an attempt to neutralize the existing hurdles, measures like conducting home and workplace visits rather than conduction of interview;<sup>8</sup> and adoption of mobile health applications to promote digitalization & easy retrieval of data;<sup>6</sup> can be implemented.

To conclude, owing to the enormous scope of contact tracing in reducing the magnitude of tuberculosis, the health staffs should be regularly motivated to ensure its implementation in the community.

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## HOW MANY OF US ARE PRACTICALLY AWARE ABOUT DIRECTLY OBSERVED TREATMENT IN TUBERCULOSIS?

The tuberculosis related prevention and control activities are planned and executed as per the guidelines released by the Revised National TB Control Program (RNTCP) in India.<sup>1</sup>

Directly Observed Treatment (DOT) has been identified as one of the crucial pillars necessary for ensuring higher cure rates.<sup>1</sup> Under the DOT strategy, a DOT provider is a trained person other than the family member, who ensures and supports the patient in consuming their anti-TB drugs.<sup>1</sup>

Owing to the longer duration of anti-TB treatment, it becomes really imperative to ensure that patients should

continue to take medications, even if the disease symptoms have subsided.<sup>1</sup> In-fact, a rapid surge in the number of drug resistant forms of TB has been observed, as the majority of the initially diagnosed TB patients is not completing their entire course of treatment.<sup>2</sup>

As it is totally unpredictable to identify the patients who will default from their therapy, DOT has emerged as an effective approach to reduce non-adherence.<sup>1</sup> In-fact, the findings of epidemiological studies have revealed a significant decline in the incidence of microbiological failure, default, acquired drug resistance, case fatality; early detection of adverse drug reactions; and improvement in the quality of life.<sup>3-5</sup>

Further, it is very important to understand that DOT does not refer to consumption of anti-TB drugs in front of a DOT provider.<sup>1</sup> It is much more than that, and in ideal circumstances, whenever a patient comes to the DOT center, it is the duty of the DOT provider to ask the patient first to sit down and relax, inquire about any complaints / issue, trace the patient-wise box based on his TB identification number, take out one strip / blister, remove the drugs from the blister and give into the hands of the patient, offer a glass of drinking water, ask the patient to consume the drugs, ensure that the patient has swallowed the drugs by using a tongue depressor (if possible); and finally, even motivate the patient to continue their treatment for the complete duration.<sup>6</sup>

However, a wide range of shortcomings have been identified in the smooth implementation of the DOT strategy in the community settings like rigid timings of the government health centers, disease associated stigma, lack of accessibility to the health centers, shortage of health professionals, poor awareness among the general population (pertaining to disease, its treatment, prevalent social norms), no awareness activities for the target population, and limited involvement of the private sector, especially in remote areas.<sup>4,6</sup>

Most of the above mentioned shortcomings can be addressed through the Treatment adherence scheme (public-private partnership scheme) in which any community DOT provider who ensures the compliance to therapy will be given an honorarium on treatment completion.<sup>7</sup>

Further, measures like preparing a streetwise DOT directory, roping in different private sector agencies, motivating private practitioners to adhere to the RNTCP guidelines; conducting periodic awareness campaigns, encouraging community volunteers to become DOT providers; ensuring proper counseling (viz. regarding the nature / duration of treatment, need of adherence) of the patient, facilitating prompt release of honorarium, and adopting innovative tools like videophone to encourage administration of DOT.<sup>2,6,7</sup>

To conclude, directly observed treatment possesses enormous potential and is a key strategy to ensure completion of the treatment and thereby significantly minimize the risk of drug resistant TB.

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## ROLE OF INFRASTRUCTURE IN THE MANAGEMENT OF DRUG RESISTANT TUBERCULOSIS IN INDIA

The evidences for antimicrobial resistance have been reported worldwide, leading to a reduction in the effectiveness of treatment for many infectious diseases.<sup>1</sup> In-fact, resistance has been observed for all first line drugs used to treat tuberculosis (TB), and has emerged as a serious challenge for the health sector worldwide.<sup>2</sup> Further, the most recent estimates for multi-drug resistant (MDR) TB, suggest that in the year 2014, almost 0.48 million new cases were reported, of which India, China and Russia accounted for more than fifty percentage of the cases.<sup>3</sup> However, by no means these estimates reflect the accurate picture as a large number of cases are never notified to the health authorities.<sup>3</sup>

Although, many reasons contribute to high case load of drug-resistant TB, nevertheless factors like weaknesses in the health system, poor infrastructure support, and scarcity of resources definitely enhances the magnitude of the problem.<sup>4</sup> In India, services for MDR-TB are delivered under the programmatic management of drug resistant TB

(PMDT) initiative since its launch in 2007, and there is a definitive plan to upscale the services in a phase-wise manner to extend the services to all.<sup>1</sup> However, owing to the resource constraints prevalent in the Indian settings, the MDR-TB diagnostic services cannot be offered to all, and thus MDR-TB suspects (or high risk) have been identified.<sup>2-4</sup> This high-risk group of patients can be screened for MDR-TB through culture and drug sensitivity testing (C&DST).<sup>2</sup>

Further, under PMDT, three MDR suspect criteria – A, B, and C were proposed to ensure gradual expansion of the PMDT services in the whole nation in tandem with the expansion of the laboratory services, so that existing certified laboratories are not overburdened.<sup>2,5</sup> Thus, Criteria-A was implemented initially in most of the parts of the nation, and based on the caseload of MDR-TB patients, plan was formulated to implement Criteria-B and C (Table 1). The ultimate set target is to implement Criteria-C by the end of 2015 in all districts of the nation.<sup>2</sup> In addition, to improve upon the diagnostic services, the process of certification of different laboratories and establishment of more national reference laboratories has been given due attention.<sup>2,6</sup> Further, the national government has also collaborated with Foundation for innovative new diagnostics (FIND) agency to consolidate the infrastructure.<sup>7</sup>

In conclusion, timely strengthening of the infrastructure under the national program can significantly assist the policy makers to accomplish the universal TB care for all.

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**Table 1: MDR-TB suspect criteria**

<b>MDR-TB suspect criteria</b>	<b>Eligibility</b>	<b>Limitations / Comments</b>
A	<p>Cat I failure at 5th month;</p> <p>Cat II smear positive at 4th month;</p> <p>All pulmonary TB cases who are contacts of known MDR-TB cases</p>	<p>Limitation - Despite the knowledge that 2-3% of the newly diagnosed TB patients and 15% of retreatment TB cases are resistant to first line drugs, even before initiation of treatment, they are still managed with ineffective drugs and thus, patients lose significant amount of crucial time.</p> <p>These patients continue to remain a potential source of transmission of MDR-TB infection in the absence of effective treatment.</p> <p>Patients, who have availed treatment from the government sector, are only eligible for free MDR-TB diagnostic / treatment facilities.</p>
B	<p>In addition to Criteria-A</p> <p>All smear positive retreatment pulmonary TB cases at diagnosis; &amp;</p> <p>Any smear positive follow-up of new cases at the end of intensive phase / later or retreatment cases</p>	<p>Patients who are on Cat-I treatment, three months are saved, while in retreatment cases, all are considered as MDR-TB suspect immediately upon diagnosis.</p> <p>Free services are offered to even those patients who were accessing private sector earlier.</p> <p>Limitation - No provisions for smear negative retreatment patients</p>
C	<p>In addition to Criteria-B</p> <p>All smear negative retreatment pulmonary TB cases at the time of diagnosis; and</p> <p>HIV-TB co-infected cases</p>	<p>No provisions for persons detected with pulmonary TB for the first time.</p>

## MOVING FORWARD TO ACCOMPLISH TUBERCULOSIS RELATED MILLENNIUM DEVELOPMENT GOAL-6

Over the last couple of decades, tuberculosis (TB) has remained a major public health threat, not only because of its magnitude, but even due to its universal distribution, associated mortality, the burden posed to the health system, increased financial expenses, and massive impact on the quality of life of the patient, their family members, and even the society.<sup>1,2</sup> Acknowledging the same, tuberculosis was included as one of the goals in the Millennium Development Goals (MDG-6) and the target was set to halt and reverse the trend of the disease by 2015.<sup>1,2</sup> However, as the magnitude of the disease has remained persistently high, the World Health Organization (WHO) has identified five key priority areas to fast track the progress and eventually achieve MDG-6, namely

**1. Reaching the missed cases:** Owing to the shortcomings in the surveillance system and because of the stigma associated with the disease, a large number of cases go unreported.<sup>1,2</sup> In-fact, in the year 2014 itself, out of the estimated 9.6 million people who were estimated to suffer from the disease, only 6 million were actually notified to the health authorities.<sup>1</sup> Similarly, only 0.12 million cases of MDR-TB were diagnosed & reported, in comparison to the estimated 0.48 million cases. This clearly indicates that millions of cases are either undiagnosed or unreported and is a major set-back for the public health authorities.<sup>1</sup> At the same time, there is an immense need to make tuberculosis as a notifiable disease, and strengthen contact tracing, so that each and every case diagnosed by any means can be offered appropriate treatment.<sup>2,3</sup>

**2. Addressing MDR-TB:** The incidence of MDR-TB has increased at an unprecedented rate across the globe and thus there is a need to strengthen the health system response to cope up with the challenge.<sup>4</sup> There is an immense need to improve upon the diagnostic services (so that results can be obtained at the earliest), ensure easy geographical access to the diagnostic services, sensitization of the health professionals to adhere to the diagnostic & therapeutic algorithm, create awareness about the serious nature of the disease among the general population / TB patients, about the need to complete the course of treatment, involvement of all the stakeholders, including private sector, and to make the health services more people-friendly (like psychosocial support, counseling, etc.).<sup>1,4</sup>

**3. Augmenting the response to TB/HIV:** TB-HIV co-infection goes hand in hand and thus should be dealt together. Even though, the number of HIV-positive TB patients who were initiated with antiretroviral therapy (ART) in the year 2014 was 0.39 million, but this was unacceptable as it was expected that ART should be initiated for all 1.2 million TB-HIV co-infected people.<sup>1</sup> The need of the hour is to streamline the entire strategy of coordination between TB & HIV related activities at different levels of the program, so that both diagnosis of opportunistic infection & treatment of the same can be offered at the earliest.<sup>1,2</sup>

**4. Augmenting financial support:** The recent global estimates suggest that a funding gap of US\$ 1.4 billion was identified to ensure smooth implementation of the existing prevention & control activities for the year 2015.<sup>1</sup> It will be extremely wrong to expect favorable results in the absence of sustained financial assistance from the stakeholders, as most of the families have to make a catastrophic expenditure on the illness and simultaneously monetary support is always required to expand the range of services, especially in remote settings.<sup>1,2,4</sup>

**5. Timely adoption of innovations in the program:** This is a crucial aspect and the national program managers should be always open to adopt recent innovations in the program to ensure benefit to the community.<sup>1,3</sup> The innovations can be like the extension of TB-Diabetes Mellitus collaborative activities, newer strategies for creating awareness about the disease, building partnership with different stakeholders, the adoption of newer diagnostic / therapeutic modalities, and adoption of online reporting.<sup>3,5</sup>

To conclude, although on a global scale we might achieve the target set for MDG-6, nevertheless wide gaps have been identified in the high burden nations. Thus, it is the need of the hour to focus on priority areas and work in collaboration to reduce the overall burden of the disease.

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## DECLARING TUBERCULOSIS AS A NOTIFIABLE DISEASE IN INDIA: A LANDMARK DEVELOPMENT IN THE PREVENTION AND CONTROL

The recently adopted Sustainable Development Goals pertaining to tuberculosis aims to minimize the TB associated death rates by 90% (in comparison with 2015 estimates), reduce incidence by 80% and ensure that no household financial status is compromised with catastrophic costs due to TB, by the year 2030.<sup>1</sup> However, the primary cause of public health concern is that almost 40% & 75% of new TB and MDR-TB cases went undiagnosed or unreported in the year 2014.<sup>1</sup> This is a big challenge for the policy makers as most of these unreported patients take some or no treatment and not only later on present as drug resistant TB cases, but even transmit the disease to numerous susceptible contacts.<sup>1</sup>

From the Indian perspective, the nation has been identified as one of the leading contributors of TB cases, accounting for almost 25% of all global cases.<sup>1</sup> Further, most of the cases often are not reported, predominantly because of the limitations inherent to the public health system, and private sector being the preferred choice of first contact for almost 70% of the general population.<sup>2,3</sup> To counter this challenge in India, since 2012, TB has been regarded as a notifiable disease (viz. all TB cases diagnosed by any means should be reported to the health authorities).<sup>4</sup> This will help the program managers to quantify the precise magnitude of the disease, so that up-scaling of the TB control activities can be planned and implemented in an evidence-based manner.<sup>4</sup>

However, the program managers have to be proactive and target all the stakeholders to ensure that the process of notification is smooth and complete.<sup>4,5</sup> In-fact, different strategies can be tried to involve private practitioners (like sensitization sessions about different basic aspects of TB, collection of notification report by the health workers, encouraging the practice of nil-reporting, regular sessions to address stakeholders' concern, etc.) and other professional bodies, hospitals, medical colleges, laboratories, etc.<sup>4,5</sup> In addition, the general population can be sensitized about the need and importance of notification through different mass media techniques.<sup>4</sup> Finally, the option of online reporting, offering some form of incentive to private practitioners as a source of encouragement, and periodic monitoring by the designated officers should be explored to enhance effectiveness of notification.<sup>4,5</sup>

To conclude, the declaration of TB as a notifiable disease was needed for a very long period of time. However, it is just the start, and it has opened numerous potential areas in

which a lot of efforts have to be put in to eventually benefit the general population in years to come.

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## ENHANCING THE CONTRIBUTION OF PRIVATE HEALTH SECTOR IN TUBERCULOSIS CONTROL ACTIVITIES IN INDIA

Time and again, it has been reiterated that the battle against TB cannot be won unless each stakeholder from the private health sector is involved, and the entire health sector fight together as a team.<sup>1</sup> In India, owing to the limitations associated with public health sector and a preference for the private sector among the majority of the population, involvement of the private sector is a must.<sup>2</sup> The Revised National TB Control Program (RNTCP) has initiated ten different schemes for TB related services, namely

1. **Advocacy Communication and Social Mobilization scheme:** The aim is to increase the level of awareness about the different aspects of the disease and the services offered.
2. **Sputum collection center scheme:** The rationale is to negate the problem of no easy accessibility to the designated microscopy centers (DMCs).
3. **Sputum pick-up and transport service scheme:** This scheme ensures that collected sputum samples are picked-up and then transported to the DMC for examination.
4. **Designated microscopy-cum-treatment center scheme:** This scheme creates a provision for a private laboratory to assist the government health authorities in reaching the diagnosis (and offering treatment through a community volunteer).
5. **Laboratory technician scheme:** It can be used if there is a shortage of laboratory technicians in the health sector.
6. **Culture and drug sensitivity testing scheme:** The aim is to reduce the burden on the existing laboratories

and at the same time speed-up the process of obtaining the results through the involvement of a private certified laboratory.

7. **Treatment adherence scheme:** To encourage community DOT providers so that the compulsion of the patients to come to the directly observed treatment (DOT) center can be neutralized.
8. **Slum scheme:** It is applicable in urban slums where people the residents have minimal accessibility to the public health system.
9. **Tuberculosis unit scheme:** Its option can be explored in those areas where the government health system is extremely poor and thus routine implementation of RNTCP prevention & control activities cannot be ensured.
10. **TB-HIV scheme:** This scheme can be implemented among high risk groups of people to meet with the special needs of the vulnerable section of society.<sup>3-5</sup>

or all these schemes, both logistic and financial support will be offered to the private service provider to ensure that all the services are delivered in a quality assurance manner.<sup>3</sup> However, there is a great need to sensitize the private sector about the existence of these schemes under RNTCP, so that they can also play a significant role in the fight against TB.<sup>3</sup> In conclusion, the private health sector possesses an immense potential and it is the responsibility of the public health sector to bridge the existing gaps and enhance their contribution in the prevention and control of the disease.

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## INCORPORATING TUBERCULOSIS IN UNDERGRADUATE MEDICAL CURRICULUM

Medical colleges, being a tertiary care health institute, plays a significant role in the diagnosis and management of the sputum negative and extra-pulmonary TB patients, management of adverse drug reactions, other program administrative activities, facilitation of research work, and

periodic modification in the existing guidelines.<sup>1</sup> However, another major role of the medical college is that they provide the platform for grooming future doctors and thus it is our responsibility to train them effectively in the different aspects of the tuberculosis disease in a systematic manner.<sup>1,2</sup>

Although, in the currently recommended curriculum, tuberculosis is taught to the aspiring doctors in their under-graduation, a wide range of deficiencies has been identified, namely poor sensitization of students about TB while entering into medical college, limited correlation between first year subjects (like anatomy / physiology) and their clinical association; dearth of integrated sessions on tuberculosis; low awareness about the recent development in the diagnosis and treatment of TB among both faculty and students, non-scientific examination format, no mandatory requirement for faculties to be trained in teaching to become teachers, and existence of a wide gap between the medical education and the public health department.<sup>3-5</sup>

Most of the existing shortcomings can be easily addressed, provided there is a mutual participation between policy makers, stakeholders from medical colleges and Medical Council of India.<sup>5</sup> These stakeholders can plan together all corrective measures like mandatory training of all doctors who want to be teachers, the introduction of a foundation course at the time of entry into under-graduation, ensure early clinical exposure from the first year itself, organizing integrated teaching sessions on TB regularly, inclusion of TB related practical questions in exams, encouraging non-formal modes or community-based teaching like role plays, planning visit of students to designated microscopy center / directly observed treatment center, motivating students to conduct short-term research work, and ensure implementation of the above measures through the medical college core committee.<sup>1,3-5</sup>

To conclude, as medical students are the future health care providers and tuberculosis is a major public health concern in India, there is a great need to train them well enough to ensure that they are ready to play their part effectively in reducing the burden of the disease once they come out of their under-graduation.

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## STRIVING HARD TO ACHIEVE UNIVERSAL ACCESS TO TUBERCULOSIS CARE: INDIAN PERSPECTIVE

In India, since the introduction of the Revised National TB Control Program (RNTCP) in 1992, the program has been geographically scaled-up and considerably improved upon various aspects to respond to the challenges of drug resistant TB, logistic constraints, administrative issues, poor infrastructure, shortage of human resources, and even lack of financial support.<sup>1,2</sup> Further, different avenues pertaining to the diagnostic set-up, treatment options, the involvement of different stakeholders (like private provider, medical colleges, international agencies, etc.), and even operational modifications in the outreach implementation of the program have been strengthened, not only to expand the reach of services, but eventually accomplish universal access to TB care.<sup>1,2</sup>

### Diagnostic services:

- Sputum microscopy has been acknowledged as the gold standard tool for diagnosis of pulmonary TB, as it is easy to conduct, high specificity-reliability-reproducibility of results, cheap, provides information about infectiousness or progress of patient put on treatment, and its feasibility in low resource settings.
- Prohibiting the use of serological tests and interferon gamma release assay.
- Project LIGHT: A project LIGHT (LED Fluorescent Microscopy in Gaining TB Cases in High workload Teaching Hospitals) has been piloted in 200 medical colleges, which have a caseload of more than 25 slides per day. This method can provide prompt results and significantly reduces the workload on laboratory technicians.
- Drug-resistant TB: In order to negate the limitations of solid & liquid culture, especially in terms of time required to get the result, RNTCP has adopted line probe assay (result obtained within 1-2 days), and Xpert TB test (results within 2 hours) in various districts of the nation.
- Development of standardized guidelines for the training of the laboratory technicians and other stakeholders.

- To start additional national reference laboratories in capital cities of Madhya Pradesh & Odisha.<sup>3-7</sup>

## Treatment of Adult and Paediatric TB

- Withdrawing category-III treatment regimen.
- A commitment to ensure uninterrupted supply of drugs through proper inventory control.
- Plan to introduce six weight bands for paediatric TB, in contrast to the existing four categories.
- Change in the dosage of isoniazid chemoprophylaxis from 5 to 10 mg/kg body weight.
- Plan to supply MDR-TB drugs in five weight bands (existing - three weight categories).
- Release of specific guidelines for storage of second line anti-TB drugs.<sup>1,8</sup>

## Other developments in the program

- Formulation of standards for TB care in India.
- Declaration of TB as a notifiable disease.
- Introduction of NIKSHAY software – To encourage online reporting & monitoring of patients.
- Stringent implementation of the airborne infection measures in health establishments.
- Up-scaling of TB-DM coordination activities in hundred districts each year.
- Strengthening of the existing TB-HIV strategies.
- Emphasis on organization of periodic sensitization sessions for all stakeholders.
- Development of a strategic document for assisting program managers in their supervision activities.
- Measures to prevent the sale of anti-TB drugs without prescription.
- Periodic revision in the financial norms: The monetary allocations have been revised for ACSM activities, conduction of operational research / thesis, grants for thesis, organized conferences, etc.<sup>1,7,9-12</sup>

Altogether, the program managers are showing lots of commitment in exercising their duties, and now it is the responsibility of the entire team of health professionals to work together in collaboration with the community to ensure that universal access to TB care is achieved.

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