

Operation ASHA TB project
Bhiwandi
Evaluation Report

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Operation ASHA TB project Bhiwandi

Acronyms

ACF	Active Case Finding
ADHS	Additional Director of Health Services, Govt. of Maharashtra
CMC	City Municipal Corporation
COO	Chief Co-ordinating Officer
CTD	Central TB Division, New Delhi
CTO	City TB Officer
DMC	Designated Microscopy Centre
DOT	Directly Observed Treatment
e-Compliance	An Android based treatment adherence recording & reporting system
e-Detection	An Android based Case Detection recording & reporting system
EMR	Electronic Medical Record
IGM	Indira Gandhi Memorial
IRL	Intermediate Reference Laboratory
NIKSHAY	Case Based electronic TB reporting system under RNTCP
LTFQ	Less Than Fully Qualified
MDR	Multi Drug Resistance
Op ASHA	Operation ASHA
PHI	Peripheral Health Institution
PP	Private Practitioner
PPP	Public Private Partnership
RGMC	Rajiv Gandhi Medical College
RNTCP	Revised National Tuberculosis Control Program
STLS	Senior Tuberculosis Laboratory Supervisor
STO	State TB Officer
STS	Senior Treatment Supervisor
TB	Tuberculosis
TU	Tuberculosis Unit
UHC	Urban Health Center

EXECUTIVE SUMMARY

Introduction

An assessment of the Op ASHA interventions using biometric based treatment adherence among TB patients registered under RNTCP was carried out on 18th to 19th July 2016 in Bhiwandi, a suburb of Mumbai having high population density with significant proportion being migratory workers. It is a high TB burden area given the quarterly TB notification rate between 212-273 per lakh population in last six quarters. Presently, it covers a population of 1.8 lakhs with the aim to improve treatment success rate using the ICT based biometric treatment adherence and to improve case detection through contact tracing and limited ACF in general population.

Methods and Tools

Assessment of the project involved desk review of documents, onsite visits to health facilities, interview with key informants including TB patients and holding meetings with State Government, other RNTCP and Op ASHA officials.

Results

Key observations

- Op ASHA is conducting e-compliance and e-detection activities through Op ASHA providers (provider) based at 6 fixed Op ASHA centers while 2 providers are mobile. Each Op ASHA center covers a population of about 25,000. A coordinator is responsible for managing the project. Op ASHA staff were found to possess adequate knowledge and skills for implementing the project.

Each field level unit for e-Compliance requires a fingerprint scanner, an android based tablet and a mobile phone. When a patient registers for TB treatment, he / she is counseled, fingerprint is scanned and electronic copy of Treatment Card is generated and data entered in the tablet gets synchronized with backend office. Each time the patient receives medicine from the center, the visit is confirmed by the terminal's fingerprint reader and e-treatment card is automatically updated. On missing a dose, the patient and the ASHA provider are communicated via SMS and the provider visits the former's residence for DOT (using the biometric system) / retrieval action. About 20% of patients miss to take the dose on any given day; about 15% doses are given unsupervised. The e-treatment card can be visualized online to track the progress of individual patients.

- The proportion of TB cases in catchment areas, availing services of Op ASHA varied from 23-62%.
- The information about sputum follow-up examinations due is automatically displayed for necessary actions by the provider.

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- The treatment success rate among enrolled patients was found to be about 88%, 2% died, 1% failed, 3% were transferred out, 2% were lost to follow-up and 4% switched to Cat IV treatment.
- Op ASHA Managers monitor the project through a set of reports generated using the online database.
- The system costs (all inclusive including equipment, space, salaries of senior level personnel, software management, travel, etc.) about Rs.5,000/- per patient treated.

Strengths

- The time taken to deploy this ICT based system at a new facility is a few hours.
- Average time interval from the time of diagnosis to enrolment under the system a satisfactory.
- Close co-ordination exists between RNTCP officials and Op ASHA staff
- There is a high level of acceptability among patients and Op ASHA as well as RNTCP staff
- The frequency of system failure is almost NIL

Weaknesses

- Extra requirement of full time personal for DOT
- Patients are required to visit Op ASHA centers at inconvenient timings which might lead to loss of wages.
- Dose reminder to patient was missing in the system
- There is no provision in the ICT based system to track the subsequent treatment taking behavior of Transferred out patients and their treatment outcome.

Opportunity

- Feasibility of linkage with Nikshay database
- Scalability in a cost effective manner by greater integration of RNTCP and Op ASHA infrastructure including manpower.

Threats

- Reluctance among RNTCP staff to use the online data for patient management thereby putting extra workload on the provider to maintain hardcopies of treatment cards.

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Key Recommendations

- SMS Reminders to patients for due doses and to patients & all concerned health care providers for follow-up sputum examination should be included as one of the applications.
- Efforts should be made to provide ICT adherence support to TB patients treated in private sector.
- Labs and other health facilities should be electronically linked with the system to ensure timely enrolment with e-Compliance.
- Online data should be made available to RNTCP staff who should also be trained in its usage for better patient management.
- The intervention can be scaled up in a more cost effective manner by increasing the proportion of patients on e-Compliance including from private sector, using the available space in public health facilities and existing staff and DOT providers under RNTCP.
- Extending the ICT based biometric system on the lines as above covering larger tracts of populations in slum areas across the country especially for Cat – II and Cat – IV patients is recommended.

PROJECT BACKGROUND

Setting

Bhiwandi CMC is a Taluk in Thane district under Mumbai metropolitan region. It has a total population of about 7.5 lakhs (census 2011) and an area of about 27 sq. km., with high population density of about 35,000 / sq. km. The houses are generally overcrowded with up to 20 persons per family. There are 700 females for every 1000 males; this low ratio is primarily attributable to a significant proportion of the population being migratory workers working in the local textile mills. More than 50% of the population resides in slums. In addition, there is a floating population of about 3 lakh every day.

Public Health services are delivered through 15 Health posts, a Taluk level hospital and a 100 bedded tertiary care hospital - Indira Gandhi Memorial (IGM) Hospital. There are 500 PPs – about half of them are allopathic and most of the other half is LTFQ.

Organization of RNTCP activities

City TB Center (CTC) is located in IGM Hospital at the Taluk level which also has a co-located ART Center. CTO based in City TB Office is responsible for managing the RNTCP activities in the CMC. There are three TUs – Navi Mumbai (NV), Bai Gulab bai Petit (BGP) and Nadinaka (NN), each managed by designated MOTC. There are 9 DMCs; one CBNAAT is functional since May 2016.

There are 3 STSs, 2 STLs, 9 TBHVs and 9 LTs (all contractual) in position; however, the sanctioned posts of contractual PPM coordinator and DRTB coordinator are vacant; there is no sanctioned post of second MO at DTC.

Sputum specimen for MDRTB suspects are sent to IRL at JJ Hospital. For most of the diagnosed MDRTB cases, pretreatment evaluation is undertaken locally but ***the patients have to bear a major proportion of the cost incurred.*** Cat IV treatment is initiated and managed with the support of DRTB center at RGMC at Thane (District Head Quarter) located about 20 km from Bhiwandi, which is operational from 2012.

Presently, there are 298 enlisted DOT providers including Op ASHA providers. ***However, the honorarium for DOT has not been paid for last 2-3 years*** and a significant proportion of such providers are PPs. Consequently, many of the PPs have stopped providing DOT services to RNTCP registered patients. However, the RNTCP staff has so far managed to recruit newer set of PPs.

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TB situation and RNTCP performance – key indicators

Bhiwandi is a high TB burden area given that the annualized quarterly TB notification rate (all cases) varied between 212-273 per lakh population in last six quarters. ***Prevalence of MDR is also high*** given that of the total of 2042 TB cases notified in 2015, 296 (14.5%) were MDR. Of 150 sputum specimen tested by CBNAAT thus far, 30 (20%) were found to be R-resistant.

Case finding efforts under the public sector are satisfactory given the presumptive TB examination rate under RNTCP between 202-232 per lakh population in each of last four quarters. The proportion of initial defaulters is about 5%. Among NSP cases, the treatment success rates have varied between 77-84% with default and death rates between 0-6% and 1-6% respectively. Among retreatment smear positive cases, treatment success rates varied between 69-77% with both default and death rates at about 4%.

About 95% of TB patients are subjected to PITC, of whom about 6% are found be HIV reactive.

Private sector involvement including notification has been rather poor; altogether 200 patients have been notified by the private sector till date.

INH tablets were out of stock thereby hampering IPT.

Operation ASHA

Operation ASHA, after approval by the state authorities, started functioning from August 2012 for a period of 3 years, covering a population of 1.8 lakh. It supports TB control work in slums of Bhiwandi, Maharashtra in collaboration with RNTCP and General Health Services under the Urban Slum NGO-PP Scheme of RNTCP. The project extension has been approved by District Health Society and confirmation is awaited from STO.

Under this scheme, one of the key interventions of Op ASHA is biometric based treatment adherence. The broad aims of the intervention are:-

1. To improve treatment adherence
2. To improve case detection
3. To ensure availability of quality data to achieve the above aims through online TB patient tracking system.

Op ASHA is conducting e-compliance and e-detection activities in the sanctioned project area.

EVALUATION

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An evaluation of the project Op ASHA in Bhiwandi was carried out on 18th to 19th July 2016.

Objectives of the evaluation were:-

- To assess the utility of Biometric ICT application developed and used by Operation ASHA
- To assess requirement of manpower, devices, infrastructure in terms of finance, if scale-up is planned
- To assess operational feasibility of scale-up
- To review acceptability of e-Compliance and e-Detection by patients & staff of the project as well as RNTCP

Evaluation Methodology

A. Group meetings

1. Inaugural joint meeting on 18th at CTC with CTO, ADHO from Directorate of Health Services, local RNTCP staff – STSs, STLs, etc., and officials of project Op ASHA – COO, Chief Technical Officer, District Coordinator wherein power point presentations followed by detailed discussions were made by CTO and COO on RNTCP performance and Op ASHA project respectively.
2. Repeat meeting on 19th July 2016 with the officials as above in order to obtain further data, information and clarifications.
3. Debriefing meeting with Deputy Commissioner, Bhiwandi CMC where all the above were also present.

B. Desk Review:

1. Project Proposal document
2. Project annual work-plan
3. Project Budget
4. e-Compliance and e-Detection results output and backend data
5. Data triangulation

C. Field visits and key Informant Interviews

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Eight facilities were visited and 26 key respondents (21 Government / RNTCP / Op ASHA officials, 5 TB patients) were interviewed. List of facilities visited and officials met is enclosed at Annexure-I.

- D. Demonstration of patient registration and marking biometric attendance for dose consumptions

The specific indicator on which the information was ascertained during the above activities is enclosed at Annexure – II.

OBSERVATIONS

HR and material requirements

- Op ASHA is conducting e-compliance and e-detection activities through Op ASHA providers (provider) based at 6 fixed Op ASHA centers while 2 providers are mobile. Each Op ASHA center covers a population of about 25,000 over 2 sq. km. area on an average. Each of the providers (except the mobile one) manages two Op ASHA centers by being available on alternate days three days a week at each center. In all there are five Op ASHA counselors and one district level coordinator who is responsible for managing the project, supervise Op ASHA providers and coordinate all activities with RNTCP officials. The requisite qualification for provider is matriculation however most providers are graduates.

In addition, there is a community partner at each Op ASHA center, who provides e-Compliance services to the patients in case they turn up for DOT in the absence of provider. Community partner generally happens to be the owner of the space and is not given any additional incentive except a small monthly rental.

The District Coordinator is a graduate and has been trained in Bhiwandi for a week. He reports to the Senior Project Manager and Chief Coordinating Officer, both of whom are based in Delhi and periodically visit Bhiwandi for supervision. In addition, there are 3 quality controllers based in Delhi who visits each Op ASHA centers in the country once quarterly for supervision of data quality.

- Each of the providers has undergone one week training at Op ASHA training facility at Delhi using the training manual for field staffs especially developed by Op ASHA for this purpose. The content of the manual was found to be good and covered all aspects of TB control and the project operations. **The entire project staff was found to be well versed with their job responsibilities and RNTCP guidelines.**
- Each field level unit for E-compliance requires a fingerprint scanner, an android based tablet and a mobile phone. For every two Op ASHA centers, three sets of devices are made available – one with provider and one each with community partner.

The electronic data is transferred using appropriate software to a central server, stored in SQL database and each individual patient's data is synchronized into a single EMR.

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- As per the discussions with COO and Chief Technical Officer, Op ASHA, it takes about 3-4 hours to deploy this ICT based system at a new facility. The project coordinator generates machine ID, adds the center details including its GPS coordinates which could be useful for detecting “Hot spots” of TB cases.
- To start enrolment of the patients in a given project area, it takes about a month after obtaining administrative and financial sanctions,

Acceptability

Process of e-Compliance

- Each of the 6 fixed Op ASHA centers has been set up in a hired space, majority within the premises of a private practitioner.

At each center, counselor needs to get registered using fingerprint scanner in order to access the device.

When a patient registers for TB treatment, he / she is counseled about duration of treatment, frequency of drug intake, cough hygiene, common side effects and the process of DOT and e-Compliance. His or her fingerprint is scanned and electronic copy of Treatment Card is generated and their details entered in the tablet that gets synchronized online with backend office at regular intervals. This first interaction with the patients including counseling and registration takes about 40 minutes. An initial home visit for address verification and counseling family members is undertaken by provider for each patient registered for e-Compliance. The locations of each ICT based unit can be tracked online using GPS.

Each time the patient receives medicine from the center, the visit is confirmed by the terminal's fingerprint reader and e-treatment card is automatically updated.

The DOT days for each Op ASHA center are fixed as – Monday, Wednesday, Friday OR Tuesday, Thursday and Saturday. The patients receive thrice weekly DOT during IP and once weekly during CP.

The provider is available at the center for about 4-5 hours three days (alternate) a week. In case the patient comes for DOT outside these hours or on days when the provider is not available at the center, the DOT and fingerprint scanning is undertaken by the designated community partner.

The mobile Op ASHA provider conducts e-Compliance activity through visits to patients' houses only.

The online data is also colour coded for easy differentiation of the categories of treatment of any particular patient

- Follow-up sputum examination: While logging in, the Tablet displays the information pertaining to which patients need to have sputum follow-up. This

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facilitates the provider to refer and ensure follow-up sputum examinations. A deadline of one week is given to ensure follow-up examination.

Process of e-Detection

Each Op ASHA provider undertakes ACF by visiting the households of registered patients to screen contacts for symptoms suggestive of TB. In addition, each provider visits 10-15 households every day to screen the residents for symptoms suggestive of TB during morning hours, before proceeding to the DOT site. The overall aim is to visit every household at least once a year. Persons found to be symptomatic are referred to the nearest DMCs and if diagnosed to be suffering from TB are registered for e-Compliance. Additionally, any patient reported to be having TB related symptoms by local PP is referred to DMC by the provider to rule out TB. However, the providers are in contact with only a handful of PPs for this purpose. DMC LT informs the provider about patients diagnosed with TB telephonically or by SMS. In addition, the provider regularly visits DMCs to find out the results of smear examination.

- The frequency of failure of the system is almost NIL as found out during interview with providers and senior officials of Op ASHA and a few patients. Any software related glitches can be solved centrally; the on-site support whenever required at any site is managed within 24 hours and problems rectified.
- **On scrutiny of data, the average interval from the time of diagnosis to enrolment under the biometric based e-compliance system varied between 1-4 days.**
- The time taken for administering each dose and marking patients biometric attendance is about 3-4 minutes
- The electronic data is available to the providers through their 'Tablets' which enable them to access information on the list of patients under ICT based treatment adherence, list of patients due for DOT on a given day, the ones who missed their doses, number of doses missed by any individual patients since his / her last visit and the e-treatment card. The data on persons screened for symptoms during ACF and the pending results of sputum examination and pending treatment initiation are also available to individual providers for necessary action.

If a patient does not report at the center on the due date, he / she is proactively contacted by the provider mostly at the former's residence and fingerprint recorded on the ICT platform. Data related to supervised DOT or missed dose of the patient is available to Project managers at their backend office. Any missed dose by patients is communicated automatically via SMS by e-Compliance software to the Senior Project managers, District Coordinator, provider for their routine monitoring and timely actions as well as to the patients. The provider is required to follow-up with the patient within 48 hours by visiting the household of the patients and counsels them to come back in the treatment network. Those who have gone out

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are contacted through phone and their family members are asked to convey the message of coming back in the treatment network.

The updated e-treatment card can be visualized online to track the progress of individual patients.

- The District Coordinator and Central Managers monitor the project through a set of reports generated using the online database including list of patients registered for treatment in a given day / week / month / quarter, list of patients with missed doses on any given day / last week / last month and the number of doses missed, patients due for follow-up sputum examination and treatment outcome.
- The duplicate treatment card in hard copy as provided by the treating MO is also maintained and updated regularly by the provider at each Op ASHA center. The RNTCP staff (STS, TBHV) use only the information in the duplicate treatment card for necessary action including patient retrieval actions. The original card is updated by the provider at the time of visiting the treating health facility, for review by the MO.
- The interaction between the counselor and the RNTCP staffs – TBHV, STS, STLS, LT, MO PHIs and CTO was found to be satisfactory. Each Op ASHA center is visited by TBHV once every week and by STS bi-weekly. The provider visits each PHI in the catchment area once every week to update the MO about e-Compliance part of activities and try to resolve issues related to individual patients. The CTO conducts once weekly meeting with district Op ASHA coordinator and providers to resolve related issues.
- Acceptability of the system was found to be satisfactory among both the patients and the providers including all categories of staff. *The interviewed patients understood that the biometric system is for their benefit. Some even stated “since the Government is making so much of effort in ensuring the regular intake of medicines, it becomes their moral responsibility to comply with the treatment protocol”. They had no issues with marking their fingerprints and did not feel the presence of any stigma due to their regular visits to the Op ASHA centers.*
- *MO PHIs, STS, TBHVs were particularly pleased to have the project and felt that it is for the benefit of patients and facilitates them in ensuring treatment adherence, initial home visits, patients retrieval and eliciting support of the family members as well as community.*

Challenges & Constraints

- Dose reminder to patient was missing in the system.
- Continuation Phase marking of adherence remains weekly and there is no mechanism to obtain real time information.

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- The cohort of patients for which report of treatment outcome can be generated for a given quarter is not the same as in RNTCP due to time lag between registration of the patients on the e-Compliance system and registration in RNTCP TB register & Nikshay.
- None of the RNTCP officials were using the online database for the purpose of monitoring treatment of individual patients and continue to rely on paper based recording of DOT. On discussion, the COO, Op ASHA was willing to sensitize them and provide them access to online data.

USEFULNESS

- Average annual TB case notification rate in last 6 quarters was 240 per lakh population per year. Considering a more conservative average annual case notification rate at 200 per lakh, there would have been about 6000 cases in last 4 years of whom 1440 (24%) were enrolled for e-Compliance in Bhiwandi while the project Op ASHA also covers 24% of the population in Bhiwandi. Of them 250 were enrolled in the last one year. Presently, 219 patients are on e-Compliance.
Of all patients enrolled, 1198 were diagnosed through house based screening including contact screening. Screening of household contacts of the patients enrolled is almost 100%.
- In June 2016, 725 household contacts were screened of whom 118 (16%) were found to be symptomatics; all of them were subjected to sputum smear examination at the RNTCP DMCs after referral.
- Cumulative number of **MDR-TB** patients enrolled for e-compliance is 36 of which 22 are currently under treatment. The treatment outcome is available for 14 patients, of whom 8 were cured.
- Of TB cases currently on treatment at the four intervention facilities visited, the proportion availing services of Op ASHA varied from 23-62%; this proportion was 5% at a non-intervention facility visited - Annexure-III (*the team could not visit more non-intervention facility due to heavy rain*).
- Of 100 patients enrolled for e-Compliance during 1st quarter of 2015, treatment success rate was 88%, 2 died, one failed, 3 were transferred out, 2 were lost to follow-up (2 months) and 4 switched to Cat IV treatment.
- A summary report generated at the Op ASHA contact center during the visit of the evaluation team revealed that ACF was undertaken amongst 2604 subjects during 1st January 2016 to 30th June 2016. Of them 533 (20%) were symptomatic, of whom 180 (36%) were diagnosed with TB; all were initiated on treatment with no initial default.

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- The satisfaction level amongst the patients was good and the purpose and benefits of biometrics were understood in interviewed patients.
- All categories of interviewed health functionaries (provider, STS, TB HVs, MO, DTO, project staff) felt that the project benefited not only the patients but also supplemented their efforts in treatment adherence, contact tracing etc.

In responding to question on how this technology has helped in reducing work? One of the TBHVs said, *"This has reduced my workload for counseling, initial house visits, retrieval actions and contact tracing"*.

Medical Officer at DOT centre said *"I am glad to have the project in the area, which benefits both the patients and the health system to ensure treatment adherence and reduces proxy DOT"*.

Challenges & Constraints

- Of all the patients registered for ATT in Bhiwandi, only about 30% were enrolled under e-Compliance and the facility was not available to the majority 70% are given DOT through the routine RNTCP mechanism.
- About 20% of patients missed to take the dose on a day they are supposed to take. Altogether, of the total doses administered, about 15% are given unsupervised due to various reasons like outstation visit, patient not being available at home during the visit of ASHA provider for retrieval action [*unsupervised doses show differently on the e-treatment card*].
- In view of its limited population coverage, there is no provision in the ICT based system to track the subsequent treatment taking behavior of Transferred out patients and their treatment outcome.
- RNTCP officials seldom used the online data for intended action and use only the physical treatment card for checking and updating for DOT.

Patient convenience:

- All the patients interviewed were glad to have the facility of e-Compliance and did not complain of any constraints. The patients' perspective has been explained above under section 'Acceptability'.
- *Reduction in out of pocket expenditure could not be elicited reliably, due to recall bias*

Cost

- *The average remuneration paid to the providers is about Rs.7500/- p.m. It is incentivized, based on the average number of supervised doses provided per patient per month and the reported treatment success rate in the last three months. Additional allowance of Rs.500/- is provided for fuel and Rs.250/- towards*

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communication expenses. The treatment supporter is compensated with Rs.300 – 500 per month in lieu of the space provided and no other incentive is allowed.

- *The average cost of each android based tablet and finger print scanner is approximately Rs.9000/- and Rs.3000 respectively. Average cost of devices per patient is calculated considering its life as three years and 150 patients enrolled per centre every year.*
- *The costs incurred by Op ASHA per patient enrolled under the ICT based adherence system is about Rs.5,000 as per the budget sheet provided by Op ASHA officials. This includes the cost of ACF activities.*
- *As per the RNTCP guidelines for Urban Slum Scheme, 2015, Op ASHA was allocated a total amount of Rs.11,51,250 as per the following norms:-*

As per the guidelines issued by RNTCP in 2015			
Scheme	Funds Allocated	No. of centers	Total budget
Urban Slum Scheme	Rs. 3.75 lakh per lakh population	8	Rs. 6,75,000
Honorarium for DOTS Provider	Rs. 1500 per patient		Rs. 1500 per patient
Administrative cost	15% of total budget		Rs. 1,01,250
Total		8	Rs. 7,76,250+ honorarium @ Rs. 1500 per patient+ 15% on Rs. 1500.

This sum was allocated under the Urban Slum Scheme with the mandate to perform other activities besides the ICT based adherence: ACF, facilitate sputum collection and transport to DMCs, ACSM activities in the community and among PPs, provide support in notification, address special needs of TB patients – drug and alcohol abuse, collect information about pending migration for appropriate actions by RNTCP officials.

- In the current scenario and structure, Op ASHA model costs about Rs.5,000/- per patient treated, though there are indirect savings in terms of lives saved, increased productivity and preventing MDR the treatment for which costs several times the treatment of drug susceptible TB.

Scalability

- The integration of Op ASHA online tracking system with Nikshay database was discussed with Op ASHA officials who were optimistic about its feasibility.

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- Though the ICT adherence software is quite comprehensive to cover essential treatment activities, there is scope for including other essential components of the programme e.g., linkage with nutritional and other support programmes, cohort based reporting of case finding and treatment activities, linkage with DMCs, CBNAAT machines and private laboratories.
- The Op ASHA senior managers were optimistic about expanding the coverage to another 1.8 lakh population in Bhiwandi CMC, a proposal for which is awaiting approval by the State Government.
- The issue of increased workload in view of the impending introduction of daily regimen in the CMC area was also discussed with senior managers who were optimistic that they would be able to mobilize the necessary resources including manpower.
- Though presently, the cost for ICT based adherence per patient is on the higher side. The scale up would need maintaining multiple devices, large staff & their capacity building and troubleshooting. The intervention could be made more sustainable by increasing the proportion of patients enrolled and utilizing the available RNTCP resources – manpower, space etc.

Conclusion

ICT based e-Compliance system adopted by Operation ASHA is an add-on mechanism to the current DOT mechanism under RNTCP. **It was found to be effective and practicable method of ensuring treatment adherence in line with WHO's recommendation: *Digital health for the End TB Strategy - an agenda for action*. It was found to be acceptable by both the patients as well as providers. Op ASHA has its merit in documenting drug consumption in presence of provider which may not necessarily be the case in presently available DOT methods in the country.** However, certain processes and review system needs to be strengthened and streamlined to utilize the full potential of existing infrastructure and technology. For large scale scalability, larger integration with RNTCP and its infrastructure is suggested.

Specific Recommendations

Strengthening of e-Compliance

- The timing of facility based DOT centers should be more patient friendly.
- SMS Reminders to patients in Hindi/ Marathi for dose and to patients as well as providers for follow-up sputum examination should be included as one of the applications.

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- The quarterly cohort of patients for monitoring treatment outcome may be aligned with quarterly treatment cohort of RNTCP so that the data could be compared.
- TB patients should be linked with social support services including nutritional supplementations.
- Definition of lost to follow-up may be revised as per RNTCP definition
- To gear up for e-Compliance with daily regimen, as Thane is one of the districts where daily regimen will be introduced in the 1st phase.
- Efforts should be made to provide ICT adherence support to TB patients treated in the private sector.

e-Detection

- The e-detection activities should be limited to vulnerable population.

e-Alert

- e-Alert, one of the applications available under Op ASHA for integrating DMC data with e-Compliance should be introduced in Bhiwandi.

Data Management

- The alignment of Op ASHA online tracking system with Nikshay needs to be explored in order to avoid duplication of efforts
- There should be allowance of rectifying data after adding a supervisor note and recording of follow-up action.

Monitoring and supervision

- RNTCP staff should have access to online data for better patient management.

Training

- RNTCP staff should be trained in use of online data.
- Further training of district coordinator along with a batch of providers at the Op ASHA training facility in Delhi and his additional training by RNTCP trainers with a batch of STSs is recommended.

Optimal utilization of resources and scaling up

The costs per patient treated can be reduced by increasing the number of patients on e-Compliance per provider and increased integration of Op ASHA infrastructure with RNTCP infrastructure by using the available space in public health facilities and existing staff. Covering the entire district wherein public health workers could serve as DOT providers while the front end and back end technical and devices support is provided by Op ASHA will make it more cost effective.

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Extending the ICT based biometric system on the lines as above covering larger tracts of populations in slum areas across the country especially for Cat – II and Cat – IV patients is recommended.

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Annexure – 1

Area	Indicators
HR and Material requirement	<ul style="list-style-type: none"> • Number of HR (at various level) deployed to implement biometric adherence system • Training status of HR and Capacity of staff to carryout activity • Availability of Standardized training material/SOP • Role of HR at each level • Requirement of ICT (Tablet, biometric reader, software, back end ICT support) • Time taken for deploying ICT based system at each facility • Time taken for enrollment of patients from beginning of starting project
Acceptability	<ul style="list-style-type: none"> • <i>Process (what, where, who, how)</i> <ul style="list-style-type: none"> ○ <i>Process of enrolling patient</i> ○ <i>Process of marking daily dose marking at DOT centre</i> ○ <i>Retrieval and patient support system procedures</i> • Frequency of failure (down time of system) in a month • Management during failure of systems • Duration of failure of system in a month • Average time for marking daily lose • <i>Use of information by staff at DOT centre (program and project staff)</i> • <i>Use of information by supervisory staff and officer(programme and project)</i> • Frequency of review of field staff by DTO using information available through software • User (patient, DOT provider, STS, TB-HV, Medical officer, DTO, project staff) satisfaction (benefit v/s challenges)
Usefulness	<ul style="list-style-type: none"> • No. (%) patients registered through biometric adherence system out of total patients on treatment from the health facility • Trend in patient registration with the biometric adherence system • No. (%) of patients interrupted treatment (missed to take a dose any day when patient supposed to take) • Average number of missed doses • Average time to retrieval of treatment interruption • Reasons for treatment interruption • Treatment outcomes among patient enrolled for biometric adherence system • Percentage of lost to follow up • Reason for lost to follow up • Any other activity performed (for example - Number (%) of patients whom contact tracing is performed and documented) • User (patient, DOT provider, STS, TB-HV, Medical officer, DTO, project staff) satisfaction (benefit v/s challenges) • How is the overall data on each dose used for corrective actions and improve outcomes) • Comparison of sputum conversion and treatment outcomes of

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Area	Indicators
	intervention and non-intervention (pre-post comparison as well compare with adjacent similar area)
Patient convenience	<ul style="list-style-type: none"> • Perspectives of patients about the added advantage of the ICT system (biometric attendance) • Reduction in Out-of-pocket expenditure by patient
Cost	<ul style="list-style-type: none"> • Cost per patient • Cost of ICT system • Cost of capacity building and technical assistance • Cost of Human Resource • Cost of establishing system (ICT infrastructure, instruments, software) and maintenance • Cost of Incentives (if any) • Cost other
Scalability	<ul style="list-style-type: none"> • Is there any possibility to interface it with Govt. Nikshay database for the patient data direct integration? • Are biometric ICT adherence software comprehensive enough to cover all essential RNTCP programmatic variables & outcome reports? Any scope to integrate DR-TB and other aspects of TB? • Is there any scope for replication of this technology based project? Is the intervention sustainable? • Which settings are more suitable for implementation of biometric based adherence system?

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Annexure – II Health / other facilities and Key informants met

Name of facility	State Government and RNTCP officials	
	Name	Designation
Office of the CMC Commissioner	Mr Kurlekar Dipak	Deputy Commissioner, BNCCM Bhiwandi
City TB Office	Dr. Babasaheb D Sorte	City TB Officer, Bhiwandi
	Dr. Bhadkumbhe S M	ADHS, Office of Jt. Director of Health Services, (TB) Maharashtra, Pune 411 006
	Dr. Jyoti Salve	RNTCP Consultant
	Mobin Sheikh	STLS
Anjurphata Health Post No.7	Dr. Varsha Barod	Mo-In-charge
	Mr. Sandeep Naik	STS
	Mr. Prashant Patil	TBHV
UHC, Nadi Naka	Dr. Milind Bhoir	Mo-In-charge
	Rakesh Kene	STLS
	Mr. Sagar Bodke	Lab. Technician
	Mr. Rishikesh Tale	TBHV
	Mr. Sandip Parab	TBHV
Op ASHA Officials		
	Mr. Ashvini Vyas	Chief Operating Officer
	Mr. Abhishek Sinha	Chief Technology Officer
	Mr. Shariq Muqri	Dist. Coordinator
Dhamankar Naka Op ASHA DOT Center	Ms. Shehzadi Momin	Op ASHA Provider
Navi Basti Op ASHA DOT Center	Mrs. Shabana Momin	Op ASHA Provider
Nizampura Op ASHA DOT Center		
Shanti Nagar Op ASHA DOT Center	Mrs. Tahira Khan	Op ASHA Provider
Gayatri Nagar Op ASHA DOT Center		
UHC, Nadi Naka	Mr. Moid Momin	Mobile provider

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Annexure – III

TB Patient Registration at DOT centres: July 2015 – June 2016

S. No.	Health facility visited	Number of Patients currently on treatment	Number of Patients Enrolled in e-Compliance
e-Compliance intervention sites			
1	Anjurphata Health Post	60	16 (27%)
2	UHC Nadinaka	67	42 (62%)
3	UHC Avchipada	34	10 (29%)
4	UHC Gaytrinagar	65	30 (50%)
Non-intervention sites			
1	UHC Millat nagar	102	5 (5%)