Quality Improvement Stories

HIV and Tuberculosis Program in Senegal

Improving the Performance of the Tuberculosis Healthcare System in Mbao, Senegal 2008-2009

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Table of Contents

Acronym List

CHW	Community Health Worker
CDT	Tuberculosis Treatment Center
CS	Health Center
DHMT (ECD)	District Health Management Team
WHO	World Health Organization
MCD	Chief Medical Officer
CMI	Collaborative Model for Improvement
IHI	Institute for Healthcare Improvement
DOT (TDO)	Directly Observed Therapy
PDSA	Plan-Do-Study-Act
PNQ	National Quality Program
PNT	National Tuberculosis Control Program
PS	Health Post
QI	Quality Improvement
RM	Region Medical (Medical Region)
TB	Tuberculosis
TPM+	Smear-Positive Pulmonary Tuberculosis

Executive Summary

Under the USAID-funded HIV/AIDS and Tuberculosis project, FHI 360 provided technical assistance to the Senegal Ministry of Health to improve the quality of services. In 2007, FHI 360 and the National Tuberculosis Program (PNT) identified an opportunity to strengthen the system of care for Tuberculosis (TB) patients in Mbao district through a structured quality improvement (QI) effort. In 2006 the performance of Mbao, although improving, was below the objectives of the PNT: the lost to follow-up rate was at 7.14% and the cure rate was 70.3%. National targets are <5% and ≥85%, respectively.

Our intent was to demonstrate that we can achieve breakthrough improvements that exceed the objectives set by the PNT by using a QI methodology. Mbao district was selected because of the high commitment of the DHMT to improving quality of TB services, and the strong leadership of the chief medical officer (MCD). We designed the QI effort on the assumption that for a well-established public health program such as PNT to exceed its objectives, changes in service delivery processes can result in a significant increase in performance.

Mbao health system comprises 16 health posts, 3-to-5 community health workers (CHWs) per health post, one district health center (hospital) with a polyvalent laboratory that conducts sputum smear exams and a specialized TB treatment center (CDT) that initiates the treatment of new cases and follows-up the patients whose treatment is not decentralized to the health posts.

FHI 360 used its generic QI model to test systems changes through the use of Plan-Do-Study-Act cycles, and managed this large scale QI effort through an adaptation of the Collaborative model developed by the US-based Institute for Healthcare Improvement (IHI). A Collaborative allows all teams involved in the QI effort to share ideas and results during quarterly learning sessions, with support visits from district coaches between learning sessions. The facility-based teams focused on the implementation of changes in order to achieve a set of common improvement objectives for each step of the process of care: identification of chronic coughers; physical screening; laboratory diagnostic; care and treatment; follow-up; and final assessment and discharge. For each objective, an improvement indicator was developed that was measured monthly, aggregated at district level, and plotted on run charts to analyse whether a change in the process of care led to an improved performance of that process.

A QI structure was established with roles and responsibilities defined for the QI teams (service providers), a collaborative management team (district managers), supported by TB experts and FHI 360 QI experts. Since performance improvement comes from making changes in a system, the QI teams implemented the following changes:

- At the community level: CHWs integrate TB messages in their community talks, identify chronic coughers during home visits and refer chronic coughers to a health facility for physical screening;
- At the physical screening step: Nurses stop advising clients to fast before going to the lab;
- At the lab. diagnostic step: Lab hours for accepting sputum smears exams are extended from 11:00am to 4:00pm; Two lab technicians perform sputum smear exams, instead of one only; and Lab technician systematically accompanies the TB+ patient to the health center the same day.
- At the care & treatment step: DOT monitors register daily drug intake of patients on a logbook; Health providers offer HIV testing (and counseling) to each new patient; and decentralized posts use HIV rapid tests;
- During follow-up: Rate of loss to follow-up patients is measured monthly instead of quarterly to initiate a rapid response; Patients who miss an appointment or take their treatment irregularly are immediately contacted by phone or through the CHWs.

Some issues, not under the control of the Mbao QI teams, were not addressed. For example, the quality control process of the sputum smear results is an issue that requires investigating the reasons why the district does not receive the results from the national laboratory or with significant delays.

Over a period of 12 to 18 months (depending on the indicator), the following results were achieved:

- The proportion of chronic coughers referred who got their first sputum smear exams within 24 hours increased from 77.3% to 96.2%.
- The proportion of TB suspects who received three sputum smear exams within 48 hours increased from 46.8% to 90.7%.

- The proportion of TB patients whose treatment started the same day as the diagnosis increased from 68.8% to 100%.
- The proportion of TB patients who do not miss a day of treatment increased from 85.2% to 97.8%.
- The proportion of TB patients who had three bacteriological controls increased from 83.7% to 94.1%.
- The proportion of new TB patients who are tested for HIV went from 0% to 100%.
- The lost-to-follow-up rate decreased to 1% in July 2009.
- The cure rate reached 90.5% in the fourth quarter of 2009, but had not stabilized yet above the national target of 85%.

The success of the Mbao QI Collaborative should not overshadow the challenges encountered. Among them, the capacity of the district team to provide regular coaching visits to QI teams and the difficulty of changing national standards even when they are not entirely supported by scientific evidence (such as the added value of the physical exam, the rationale for doing a third sputum smear when the first two are positive and the sampling method for the quality control of sputum smears). Another significant challenge was the establishment of a quality monitoring system, especially when process indicators are new to the teams.

Among lessons learned that can benefit similar QI projects, the continuity of the district leadership is key to success, as well as the involvement of the national programs when they exist. Also, the exact contribution of changes on the improved performance is sometimes difficult to establish in the absence of exact knowledge about the timing of the implementation of a change. Finally, team ownership of the improvement process is more important than implementing the perfect change, a potentially frustrating situation for the QI expert who acts as a change agent.

After the presentation of the results to the Ministry of Health, FHI 360 was asked to replicate the TB improvements and spreading the QI dynamic in five additional districts of Dakar medical region, and to start a structured QI effort for HIV/AIDS services, with voluntary counseling and testing as an entry point, in five districts of the Dakar Medical Region.

Introduction

Tuberculosis (TB) is one of many priority diseases in Senegal. The fight against tuberculosis is managed by the National Tuberculosis Control Program (PNT) of the Ministry of Health. The program relies on the national health system which includes 14 regions and 69 health districts. According to WHO (WHO Report 2007, Global Tuberculosis Control) the national incidence rate of smear-positive tuberculosis in Senegal is estimated at 110/100,000 inhabitants. In 2006, the PNT notified 10,554 cases of all forms of tuberculosis, 6,882 of which are new cases of smear-positive pulmonary tuberculosis (TPM+), which is a detection rate of 57% (Annual PNT Epidemiological Report 2006). Analysis of morbidity reveals major regional differences. In 2006, 44% of all TB cases were notified by the health-care facilities of the Dakar region.

The Mbao health district serves a population of around 308,938 inhabitants. This district covers one of the most heavily populated areas within the Region of Dakar. The high population density of Mbao district (9,657/km^2) is a factor of high transmission of pulmonary TB; in 2006, 5.4% of all new reported cases of TB in Senegal came from Mbao district.

The care and treatment services for TB patients in Mbao are managed and delivered through a 3-tiered system.The first tier is made up of 16 health posts, which are the first points of contact between the formal healthcare system and the population. The treatment of TB patients is available at eight of these 16 health posts. The other health posts play a more minor role in the follow-up of patients under treatment. Each health post works with 3-5 community health workers (CHWs). At the next level up, one district health center (hospital) with a polyvalent laboratory conducts sputum smear exams and a specialized TB treatment center (CDT) located in the same compound initiates the treatment of new cases and follows-up the patients whose treatment is not decentralized to the health posts. The last tier is a district health management team which is composed of two doctors, one primary health care supervisor, one chief nurse, one TB treatment officer, and one laboratory officer. They oversee the implementation of the TB control activities planned by the PNT of the Ministry of Health and supervise the TB activities in peripheral units.

TB services in Mbao are supervised jointly by the district health management team, the Dakar medical regional team, and the PNT. Supervision visits have been sporadic and help prepare for the data review meetings of the National TB Program that are taking place each semester. A new development in Senegal's health system is the establishment

of a National Quality Program (PNQ) in charge of defining strategies for improving the quality of services, directly under the authority of the Director General for Health and whose mandate is to provide assistance to all directions and programs of the ministry of health. However, this program is nascent, has only two staff, and its strategic plan has not been operationalized yet.

In Senegal, the World Health Organization (WHO) estimates the incidence rate of TB to be 150/100,000 in Dakar, with a stable rate over the past five years. The performance of Mbao district in TB control at the beginning of the Tuberculosis Quality Improvement project is reflected by selected data in Table 1 as well as national data for comparison. Because TB is an "old" problem addressed through a well-established national public health program with support from many partners, resources were available and standards of care explicitly developed, which explains why the performance of Mbao district was quite good. However, because performance stagnated at levels below the national objectives, local authorities in Mbao were looking for a new approach to complement what had been achieved.

Table 1: Epidemiological & Performance Data of TB in Mbao District prior to the Collaborative

Data	PNT Objectives	Senegal/ 2006	Mbao District				
			2002	2003	2004	2005	2006
Number Of New Cases Declared		7,084	344	411	404	473	380
Detection Rate	≥70%	60%	89.35%	104.3%	100%	114.2%	89%
Lost to follow-up	<5%	10%	23.25%	19%	12.62%	13.95%	7.14%
Cure rate	≥85%	69%	54.9%	59.12%	71.8%	67%	70.3%

The idea of using a quality improvement (QI) model for TB in Mbao came from discussions between the district health management team (DHMT), the national Tuberculosis control program, the PNQ and FHI 360. The intent was to demonstrate that we can achieve breakthrough improvements that exceed the objectives set by the PNT by using a modern QI methodology that adds value to a public health program. The other reason to select Mbao district was the high commitment of the DHMT (Photo 1) to improving quality of TB services, the cure rate and the lost-to-follow-up rate, with strong leadership of the chief medical officer (MCD). We designed the QI effort on the assumption that for a well-established public health program such as PNT to exceed its objectives, changes in service delivery processes can result in a significant increase in performance. The latter would not happen spontaneously or through traditional

interventions (more training, more resources and more supervision), but through the application of a scientific method that analyzes in-depth the entire TB system and involves all stakeholders in a coordinated teamwork. FHI 360 suggested managing a structured large scale QI effort through the Collaborative Model for Improvement (CMI) to address the performance issues of Mbao TB system of care.

Photo 1: Mbao DMHT (Dr. Ndeye Maguette Ndome; Mr. Mamady Soumare; Mme Awa Salla Gning; Mr. Ibrahima Ba)

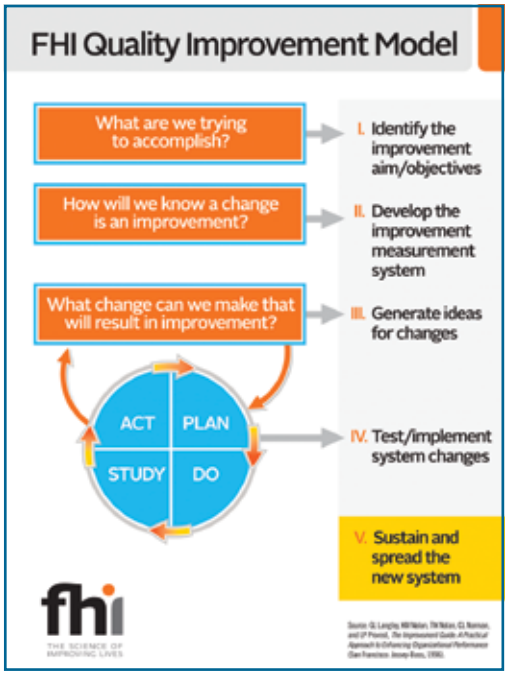
FHI 360's Model for Quality Improvement

FHI 360 used the quality improvement model represented in Figure 1. This model guides a team of service providers as they test system changes through the use of the Plan Do Study Act (PDSA) cycle.

The four main steps are:

1. *Identify the explicit improvement aim and objectives* These should express a benefit for the beneficiaries/population in measurable terms.
2. *Develop the improvement measurement system* where the improvement team collects a few indicators, frequently, on a small sample of sites or beneficiaries, and plot the results on run charts.
3. *Generate ideas for changes,* Accomplish this step through brainstorming, benchmarking and referring to a list of known change concepts.

Figure 1: FHI 360's Model for Quality Improvement



4. *Test and implement the system changes (with the PDSA cycle)* Changes are introduced on a small scale (a few units); either one by one or as a package of changes, and their effect on the improvement aim/objectives is assessed through the measurement system established in step 2. If a specific change yields improvement, it is sustained and replicated into the rest of the system. If the change does not yield the expected improvement, it is then abandoned and another change is tested.

When a structured QI effort using the rapid improvement model above is implemented on a large scale, its management is best supported through the Improvement Collaborative, a framework designed with the following features:

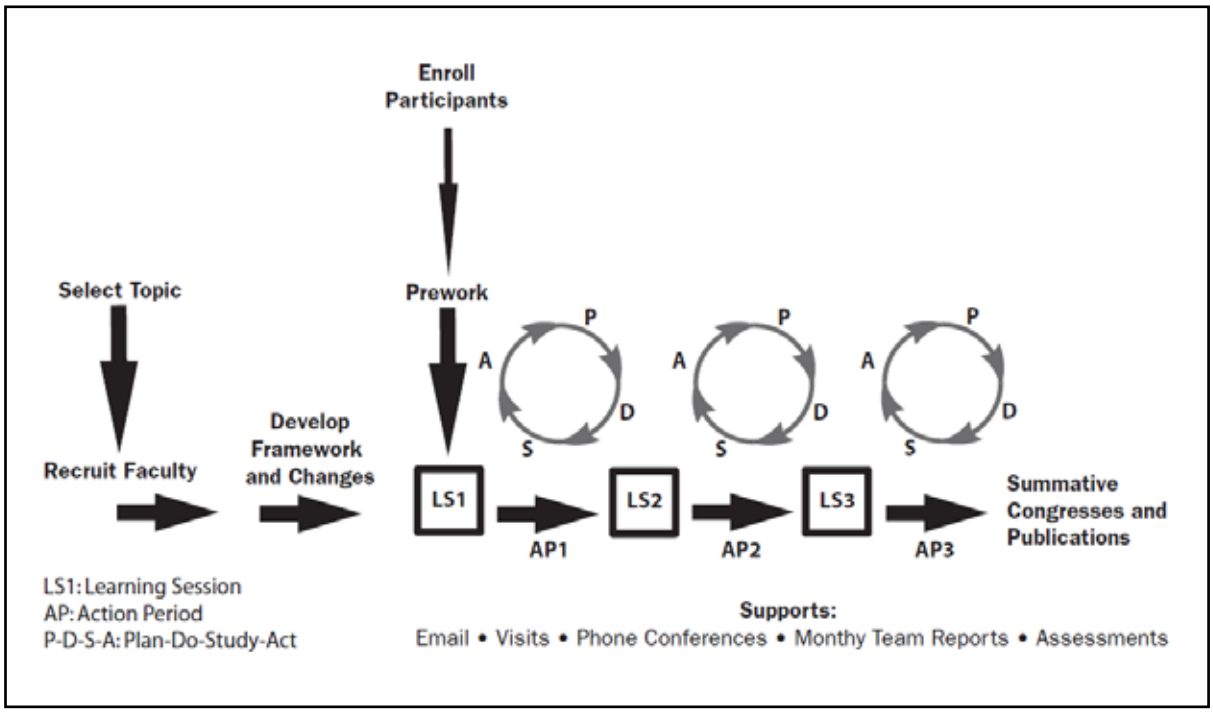
- Common improvement aim and objectives for all service delivery sites involved.
- Common improvement monitoring system based on the frequent collection of a few indicators and their interpretation through run charts.
- An operational structure organized around teams that perform specific roles and responsibilities: quality improvement teams, management team, strategic leadership team, QI expertise team and content-expertise team.
- A change package, which is a combination of explicit and evidence-based standards of services and best practices for the organization of service delivery.
- A coaching system for supporting the quality improvement teams in implementing the change package and measuring its effects.
- An improvement model focused on identifying and implementing changes and testing their impact through repeated PDSAs during action periods.
- Learning sessions during which teams share their experience with the implementation and results of the change package.

The figure below, from the Institute for Healthcare Improvement[1] (IHI) represents the dynamic of a Collaborative, with its two phases:

1. The *preparation phas*e, during which the first five essential features listed above are put in place;
2. The *implementation phase*, where action periods and learning sessions alternate to study the effects of changes on the improvement objectives;

[1]The Breakthrough Series: IHI's Collaborative Model for Achieving Breakthrough Improvement. Institute for Healthcare Improvement, 20 University Road, 7th Floor, Cambridge, MA 02138. Website: www.ihi.org.

Figure 2: IHI Improvement Collaborative Model



The successful management of a Collaborative requires that specific functions be performed in a coordinated manner: implementing changes at the point of service delivery; supporting the efforts of the teams at the management level; justifying the evidence behind standards of care and the service delivery model; and guiding the whole group through the steps of the Collaborative model. A structure was established for the Mbao collaborative, made of five groups (or teams), each one with specific roles and responsibilities (see Table 2).

Table 2: Responsibilities of Teams involved in the QI Collaborative

Teams	Responsibility
QI expert team: PNQ, the national reference laboratory, and FHI 360	Design the Collaborative, train the stakeholders in the improvement process and tools, and provide technical assistance through all the phases of the Collaborative
Quality Improvement Teams: TB service providers in five health posts (at the beginning) and the related community health workers, the district laboratory, and the TB treatment center	Measure quality of services, identify quality issues and their causes, generate ideas of changes and implement changes in the service delivery processes
Collaborative Management Team: District Medical Officer, Deputy District Medical Officer, PHC Supervisor, Chief Nurse, Chief of the Laboratory, and Chief of the TB treatment center	Provide day-to-management and support to the improvement teams through coaching visits
Strategic Leadership Team: representatives of the national Tuberculosis program, the national Quality program, the supervisor of PHC from the Dakar Medical Region, and the Mbao District Medical Officer	Support changes, address issues beyond the control of QI teams, and identify best practices to replicate nationwide
Tuberculosis Expert Team: five people from the PNT, the Fann University Hospital (Head of Pulmonary Disease Unit), the national reference laboratory, the Mbao District Medical Officer, and FHI 360	Bring scientific knowledge of the evidence that supports the national standards, and guide and train the improvement teams in the case-management of tuberculosis patients

Detailed terms of reference was developed for each of the groups, which defined very precisely the membership, their roles, their responsibilities, their relationships with the other groups, and the activities that they are supposed to carryout.

Development of Aims and Objectives

Photo 2: The QI Teams (District Health Management Teams and Heads of Health Posts)

The improvement aim of the Collaborative was finalized after reviewing the existing data on the performance of TB case-management in Mbao during analysis stakeholders' meeting involving representatives from the five groups described above, and adjusted after completing a systems' analysis. A high-level flowchart was developed by the QI teams (see Photo 2) and was used to identify the main steps of the process of care for patients with TB in Mbao, who was carrying them out, and at what level of the health system (see figure 3).

Figure 3: Flow chart used by QI teams

The QI teams identified the aim as to improve the system of care and services for patients with pulmonary tuberculosis in Mbao district, starting with the identification of chronic coughers and ending with the discharge of cured patients.

The improvement objectives of the Mbao Collaborative were finalized after in-depth analysis of the system, using detailed flowcharts to describe each step of the high-level flowchart. Improvement objectives were derived from the flowcharts, with health outcome objectives reflecting the performance of the overall system (cure rate) while other objectives (coverage, outputs) reflect the performance of specific processes (see Table 3).

Table 3: Improvement Objectives of the Mbao Collaborative

Process	Improvement Objectives
Identification of Chronic Coughers	1. All chronic coughers who are identified by the CHWs and referred to a health post receive their clinical screening within 7 days of the referral
Physical Screening	2. All chronic coughers referred by the health post to the laboratory do their first sputum smear exam within 24 hours
Laboratory Diagnostic	3. All chronic coughers arriving at the laboratory receives three sputum smear exams within 48 hours after arrival 4. At least 95% of sputum smear exams are correctly interpreted by the laboratory technician, as defined by the national quality control laboratory
Care & Treatment	5. All patients with confirmed active TB start the treatment the same day as the results are announced 6. All patients with active TB receive complete information about their disease and about the importance and benefits of the treatment, according to standards defined by the PNT
Follow-up	7. All patients benefit from a bacteriological follow-up according to the standards of the PNT, the last week of the second, fifth and sixth month following the start of the treatment 8. All patients benefit from a directly observed treatment, according to the standards of the PNT 9. All patients benefit from a HIV test before the end of their TB treatment
Final Evaluation and discharge	10. The lost-to-follow-up rate is kept below 5% 11. At least 85% of TB patients are declared cured after 6 months of treatment, according to the norms of the PNT

The aim statement of the Mbao Collaborative was developed after a situation analysis was performed. The situation analysis consisted in sharing knowledge about the TB system of care in Mbao between all stakeholders of that system: community health workers, providers in health posts, lab technicians, TB provider at district health center, district supervisor, etc. In general, individuals have an in-depth knowledge of the processes for which they are responsible, but limited knowledge of the processes performed by others who interact with the same patient. The intent was to share this knowledge between all stakeholders during one meeting so that every person involved in the TB system would have the same comprehensive view of that system and how their specific role influences the performance of the entire system. Therefore, each person involved in TB in Mbao gathered information using a list of topics/questions that was developed by FHI 360, but no new primary information was collected. It was also the first time that all categories of personnel involved in the activities of the PNT at all levels met to discuss its performance.

Establishing a Quality Improvement Monitoring System

The development of improvement measures is an early step of a Collaborative, in order to establish an improvement monitoring system before changes are implemented. Improvement indicators were developed, with the intent that they would measure the achievement of the aim and improvement objectives as closely as possible while limiting the number of indicators and the level of effort for their collection by the QI teams themselves. Table 4 presents the complete list of improvement indicators developed, their relationship to the improvement aim & objectives, and their operational definitions.

Specific data collection forms were developed for each indicator to serve as job-aid for the teams and limit the risk of errors. The improvement measures were collected by the members of the QI teams, and plotted on run charts to interpret the effect of changes at the level of each facility/QI team and then aggregated at the district level to reflect the overall performance of the entire system and of specific processes. Indicators were of two types:

- *Indicators that were already collected by the PNT and for which sources of information were available.* The only change for these indicators was an increase in the frequency of data collection, from quarterly to monthly. For these indicators, teams were able to observe a trend before changes were implemented.

- *Indicators that were new and for which new data collection forms were developed or existing forms were adapted (such as adding columns to report dates on logbooks).* For these indicators, the first data collection point represents the baseline/starting point. Most of the process indicators are new ones.

The establishment of the improvement monitoring system required a significant level of effort, with specific coaching visits to each QI team and training in the QI measurement activities. The development of some forms for data collection took some time, especially when it required health providers to record information in a more precise way. For example, the mention of the duration of a "chronic cough" on the patients' medical record led to different interpretations. Now, the exact number of days of coughing is mentioned, so that the identification of a chronic cougher meets the definition of the PNT (more than 15 days).

Table 4: Improvement measures of the Mbao Collaborative

	Objective	Indicator/Operational definition
1	All chronic coughers who are identified by the CHWs and referred to a health post receive their clinical screening within 7 days of the referral	Proportion of chronic coughers who arrive at the health post for physical screening within 7 days of the referral by the CHWs, among all chronic coughers referred each month by CHWs as evidenced on their referral logbook
2	All chronic coughers referred by the health post to the laboratory do their first sputum smear exam within 24 hours	Proportion of chronic coughers who get their first sputum smear exam within 24 hours of the referral, among all chronic coughers referred each month by the health posts, as evidenced by the date on the referral slip
3	All chronic coughers arriving at the laboratory receives three sputum smear exams within 48 hours after arrival	Proportion of chronic coughers who completed all three sputum smear exams in 48 hours, among all chronic coughers referred each month by the health posts, as evidenced by the date on the referral slip
4	At least 95% of sputum smear exams are correctly interpreted by the laboratory technician, as defined by the national quality control laboratory	Proportion of sputum smear slides whose results, positive or negative, are confirmed by the national TB reference laboratory, among a sample of slides sent every quarter by the district laboratory
5	All patients with confirmed active TB start the treatment the same day as the results are announced	Proportion of TB patients who start the treatment the same day that they receive the results from the laboratory, among all the new patients diagnosed with TB this month

Table 4: Improvement measures of the Mbao Collaborative *(continued)*

	Objective	Indicator/Operational definition
6	All patients with active TB receive complete information about their disease and about the importance and benefits of the treatment, according to standards defined by the PNT	Proportion of patients who receive complete information about TB and its treatment according to PNT standards, among all new patients diagnosed this month
7	All patients benefit from a bacteriological follow-up according to the standards of the PNT, the last week of the second, fifth and sixth month following the start of the treatment	Proportion of patients who completed all three bacteriological controls the last week of the 2nd, 5th and 6th month, among all patients who completed 6 months of TB treatment this month
8	All patients benefit from a directly observed treatment, according to the standards of the PNT	Proportion of patients who complete their TB treatment under DOT without one day of interruption, among all patients who completed their treatment this month, as evidenced through the logbook of the monitor
9	All patients benefit from a HIV test before the end of their TB treatment	Proportion of patients tested for HIV before the end of their treatment, among all patients who completed their treatment this month, as evidenced by the results of the tests
10	The lost-to-follow-up rate is kept below 5%	Proportion of patients who have stopped their treatment for more than 2 months, measured every month among all patients under treatment
11	At least 85% of TB patients are declared cured after 6 months of treatment, according to standards of the PNT	Proportion of patients with a negative sputum test at the end of the 6th month of treatment, among all patients who have completed their treatment, measured every quarter

Implementing the Changes

Because there is no improvement in performance of a system without changes made in that system, the development of a "package" of changes is always a key feature of an improvement effort. Teams discussed two types of changes, one addressing the content of the care itself (the standards) and the other the service delivery model (how care is provided). Table 5 shows the package of changes within each process, whose implementation started in September 2008.

Table 5: The package of changes of the Mbao Collaborative

Process	Changes Identified	Interventions that supported the changes
Identification of Chronic Coughers	1. CHWs integrate TB messages in their community talks 2. CHWs identify chronic coughers during home visits 3. CHWs refer chronic coughers to a health facility for physical screening	• 60 CHWs were trained in detecting chronic coughers and delivering TB messages • A referral logbook was developed
Physical Screening	4. Nurses stop advising clients to fast before going to the lab	• Nurses knowledge were updated on standards for sputum smear exams and on counseling patients for immediate referral
Laboratory Diagnostic	5. Lab hours for accepting sputum smears exams are extended from 11:00am to 4:00pm 6. Two lab technicians perform sputum smear exams, instead of one only 7. Lab technician systematically accompanies the TB+ patient to the health center the same day	• Another lab technician was trained in sputum smear exams • Lab personnel was informed of their new responsibility to accompany each TB patient to the health center • Date of lab diagnosis is now written on the treatment center register
Care & Treatment	8. DOT monitors register daily drug intake of patients on a logbook 9. Health providers offer HIV testing (and counseling) to each new patient 10. Decentralized posts use HIV rapid tests	• Logbook for recording daily drug intake were developed and DOT monitors trained in their use • TB treatment centre was reorganized to allow providing confidential counseling for HIV • Decentralized posts were allowed to use the HIV rapid tests for TB patients and not just for pregnant women
Follow-up	11. Rate of loss to follow-up patients is measured monthly instead of quarterly to initiate a rapid response 12. Patients who miss an appointment or take their treatment irregularly are immediately contacted by phone or through the CHWs	• Communication mechanisms about irregular patients were discussed and reinforced (phone, home visits), triggered by the first missed appointment

Most of the changes that were implemented are "small" changes that simply allow teams to organize logically service delivery and comply with explicit standards from the PNT. Because of the dynamic of improvement that a Collaborative creates and because of the in-depth focus on processes, teams were able to suggest and implement changes on aspects of the TB care system that would otherwise not be discussed and addressed. Some issues, not under the control of the Mbao teams, were not addressed. For example, the quality control process of the sputum smear results is an issue that requires investigating

Photo 3: Mrs. Awa Salla Gning explains TB to a new patient (Mbao Rehabilitation Treatment Center)

the reasons why the district does not receive the results from the national laboratory or with significant delays.

Interventions and changes were formally initiated in September 2008. It took some time for some changes to be implemented, such as the notification of the duration of the cough on the register of the health post. Overall, the implementation of changes did not require significant effort or resources. Some interventions, like the physical rehabilitation of the treatment center and laboratory, have contributed to the implementation of some changes, such as confidential TB and HIV counseling and sputum smear exams.

The Mbao Collaborative required that QI teams be supported technically and be motivated for QI. Twenty two people were trained in coaching techniques in April 2008, including the DHMT, PNT supervisors, PNQ, Dakar Medical Region, and FHI 360. The training lasted five days.

Photo 4: Mr. Mamady Soumare examines sputum smears for patients with a chronic cough in Mbao rehabilitated laboratory

The first meeting of the team of coaches took place on May 8, 2008 to plan for the coaching visits. In the beginning the coaching sessions were scheduled weekly, but due to difficulties in availability of the national-level coaches (PNT, RM/Dakar, PNQ, FHI 360), the meetings were scheduled every two weeks. The agenda for each meeting was sent by email to all the members before the meetings. The meetings themselves were held at the Mbao Health Center (for the laboratory and CDT QI team sites), and at three Health Posts where treatment is decentralized. Under these circumstances, the coaching visits required at least three vehicles and one coach for each QI team. In the face of too few vehicles or coaches, the teams adopted a different approach – instead, all the teams met at the health center, which made them seem more like "mini" learning sessions. Coaching visits were carried out without a specific standardized form/document and the focus evolved along with the progress of the Collaborative through the different phases and steps.

Studying the Results

Learning sessions are meetings of all QI teams and the management team, during which the nature, implementation and impact of changes are discussed in order to identity best practices and share ideas for replication. For practical reasons, learning sessions of the implementation phase have been the continuation of the coaching sessions, with a focus that shifted from the development of the monitoring system to its analysis for identifying effective changes. Almost all the coaches from the national level attended these meetings – PNT, PNQ, FHI 360 and the RM/Dakar – and all the members of the District health team participated regularly. These sessions were particularly useful for data collection as well as the production of the flow charts. The discussions that ensued between the coaches and service provides allowed for real-time evidence-based feedback and encouragement for the service providers.

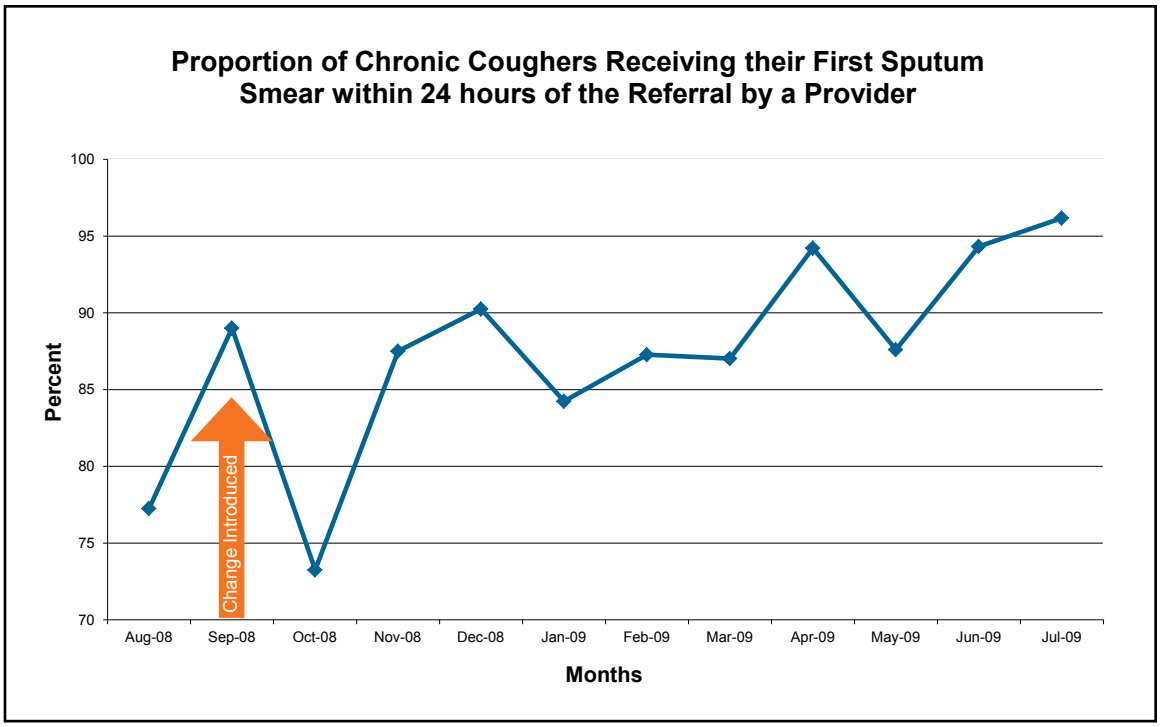
Results are presented through the run charts that were constructed from the improvement monitoring system from 2008 to 2009. The exact time periods covered by the run charts vary, depending upon the availability of data before the changes were implemented in September 2008. For example, the run chart tracking lost to follow-up shows the performance over six months prior to September 2008 since this indicator was measured prior to the Collaborative. Additionally, the cure rate for TB is an indicator that has been tracked by semesters for many years prior to the Collaborative, so the run chart displays this data from 2007 onward. For indicators that were not measured before but for which the information was collected (HIV testing rate, bacteriological controls), a retrospective survey allowed computing them six months before September 2008. For all other indicators, not measured before and for which the information was not available, the run charts start in August/September 2008 and the first data point represents the initial situation, even when changes had already started to be implemented.

Out of the 11 improvement objectives developed, the teams were able to report on eight of them. Sufficient data was not available to measure indicators for objectives #1, #4, and #6. The timeliness of referral of chronic coughers to the health facility by the CHWs, Objective #1, could not be computed, because there are basically no chronic coughers identified by the CHWs, or extremely small numbers (maximum one per month). The accuracy of the sputum smear results, Objective #4, could not be calculated because the district did not receive the results from the national reference laboratory. The quality of the TB counseling, Objective #6, could not be computed because it was not measured by the district or coaches.

Objective #2: All chronic coughers referred by the health post to the laboratory do their first sputum smear exam within 24 hours

This indicator was not measured before the Collaborative started and the first measure in August 2008 represents the baseline. The average proportion of chronic coughers referred who got their first sputum smear exams within 24 hours increased from 77.3% before the introduction of changes to an average of 88.2% after (see Figure 4). In July 2009, the last available measure, 96.2% of referred patients has their sputum smear results within 24 hours. The run chart exhibits less variation each month, an indication of standardization of this process, which is now stable between 85% and 96%. This indicator reflects not only systems' changes, but also the willingness of patients to follow the advice of health providers and to immediately go the laboratory, a behavior influenced by many factors.

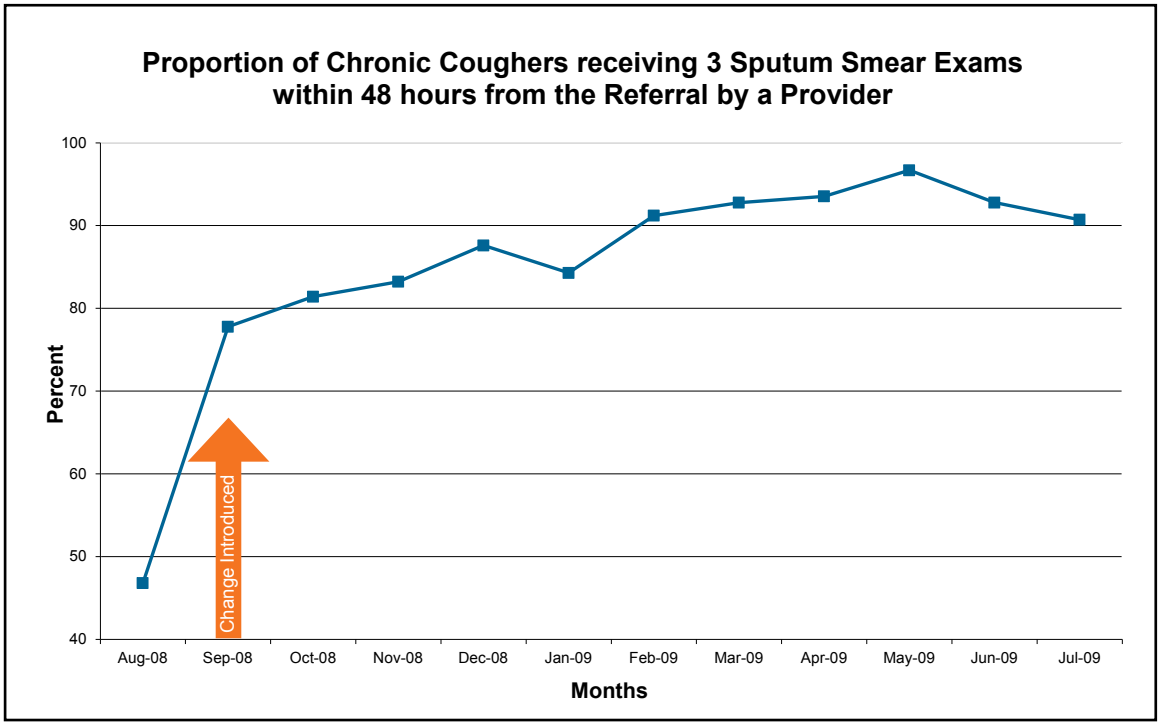
Figure 4



Objective #3: All chronic coughers arriving at the laboratory receives three sputum smear exams within 48 hours after arrival

This indicator was not measured before the Collaborative started and the first measure in August 2008 represents the baseline. The average proportion of TB suspects who received three sputum smear exams within 48 hours increased from 46.8% before the introduction of changes to an average of 89.4% after (see Figure 5). In July 2009, the last available measure, 90.7% of referred patients has their three sputum smear results within 48 hours. This indicator reflects not only systems' changes, but also the willingness of patients to follow the advice of health providers and to return to the laboratory the following day, a behavior influenced by many factors.

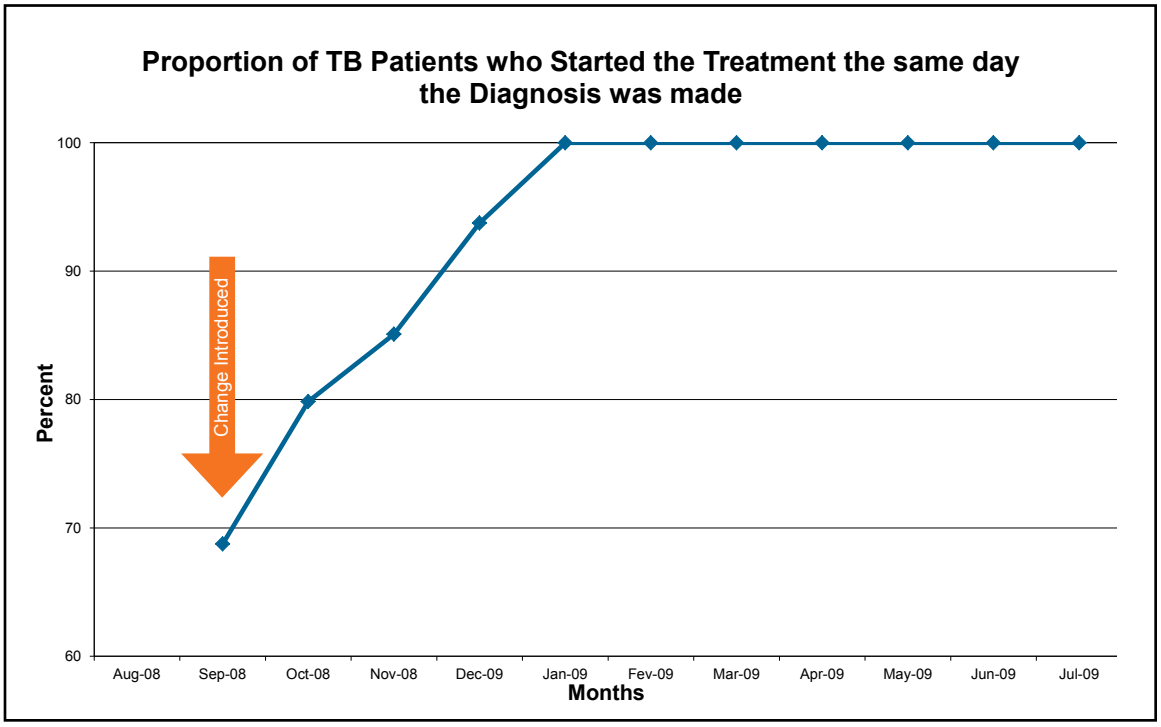
Figure 5



Objective #5: All patients with confirmed active TB start the treatment the same day as the results are announced

We do not have data on this indicator prior to the Collaborative because the date of the lab exam was not written on the logbook of the treatment center, preventing comparison between the two dates. Since changes were implemented in September 2008, the average proportion of TB patients whose treatment started the same day as the diagnosis increased from 68.8% to 100% and remained there since January 2009 (see Figure 6). This indicator reflects mainly systems' changes, since no patient has "refused" to be accompanied to the treatment center.

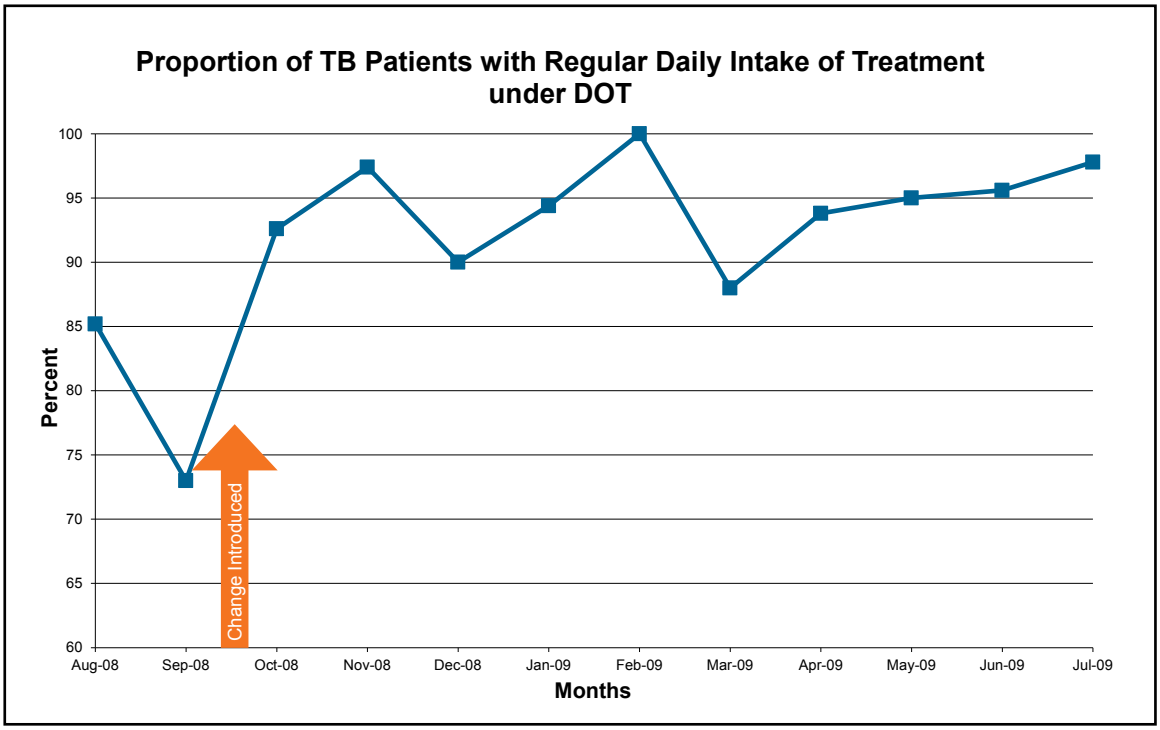
Figure 6



Objective #8: All patients benefit from a directly observed treatment, according to the standards of the PNT

The average proportion of TB patients who do not miss a day of treatment increased from 85.2% before the introduction of changes to an average of 94.5% after. In July 2009, the last available measure, 97.8% of patients adhere to a daily intake of TB treatment. The run chart exhibits less variation, an indication of standardization of this process, which is now stable between 90% and 100% (see Figure 7). Given that this indicator is calculated in a very strict way (zero-day missed), the results are quite significant.

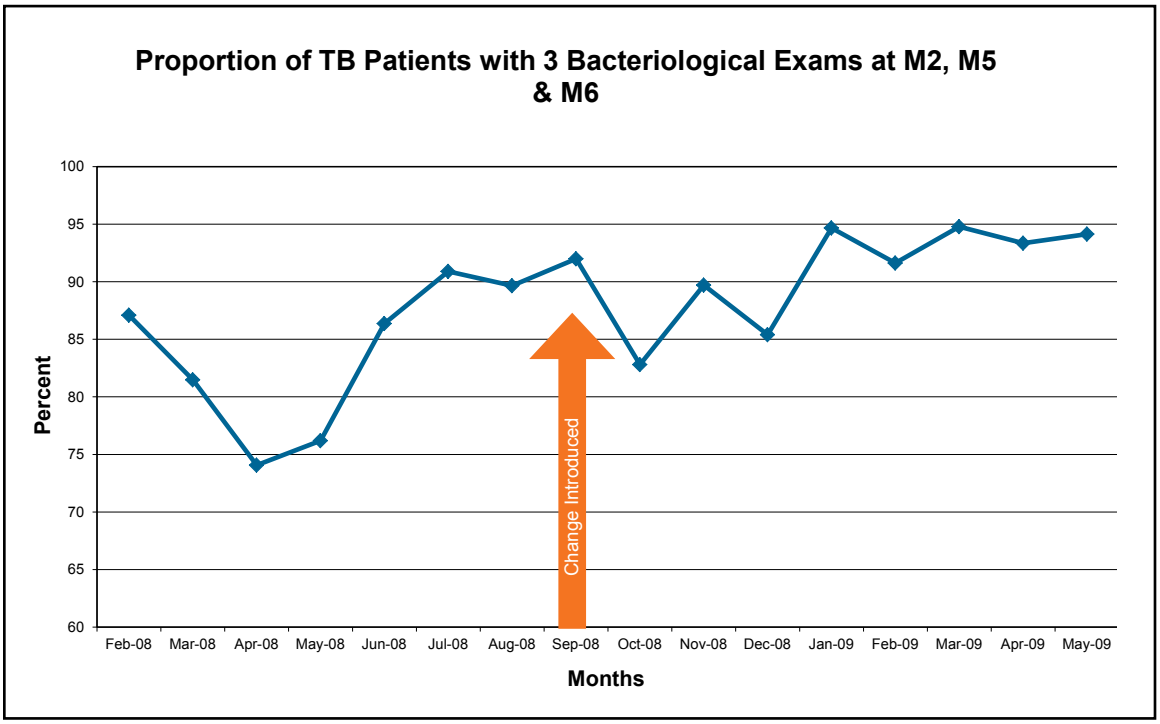
Figure 7



Objective #7: All patients benefit from a bacteriological follow-up according to the standards of the PNT, the last week of the second, fifth and sixth month following the start of the treatment.

This indicator was measured monthly for the six months prior to the introduction of the package of changes in order to capture a trend. The proportion of TB patients who had three bacteriological controls (sputum smears) at the second, fifth and sixth month has slightly increased: 83.7% before the QI activities started compared to an average of 90.9% after (see Figure 8). In May 2009, the last available measure, 94.1% of patients have their three sputum smear exams as planned. The run chart exhibits less variation, an indication of standardization of this process, which is now stable between 90% and 95%. This indicator reflects a mix of systems' changes (close monitoring and tracking of patients), and also the willingness and capacity of patients to adhere to health providers' advices.

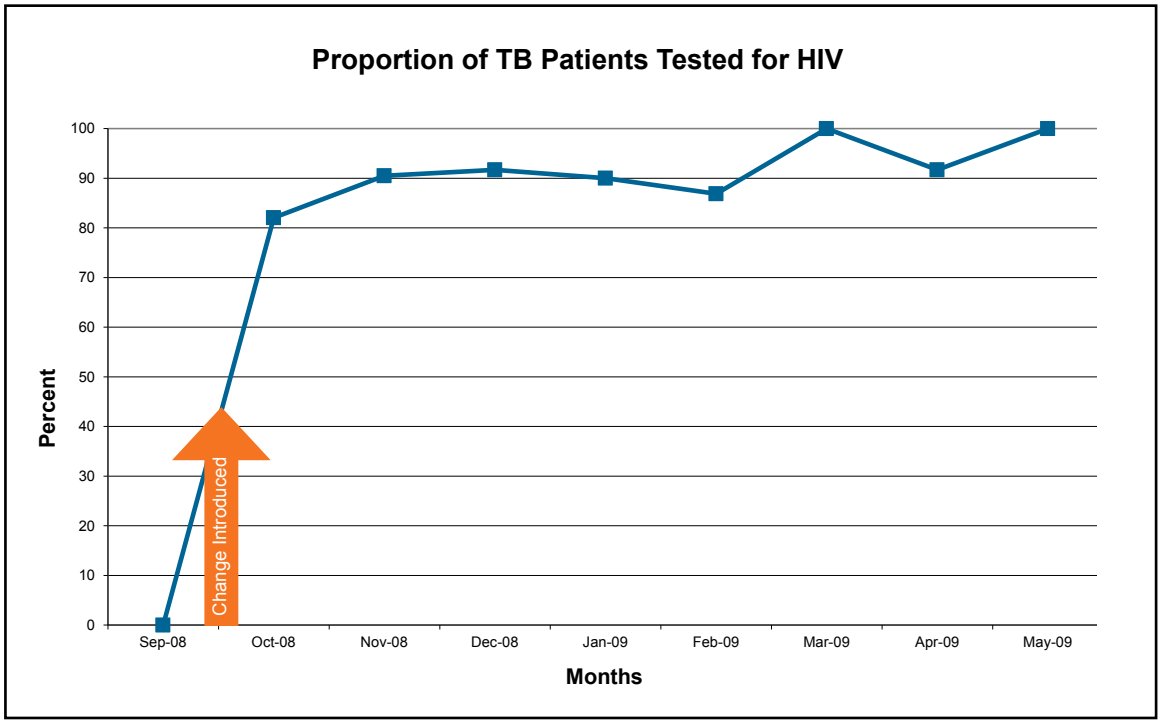
Figure 8



Objective 4: To improve the quality of 8 essential services to HIV clients

At the beginning of the Collaborative there was virtually no patient who received an HIV test. The average proportion of new TB patients who are tested for HIV increased from 0% before the introduction of changes to an average of 88.6% after (see Figure 9). In May 2009, the last available measure, 100% of patients has been tested for HIV. This indicator reflects a mix of systems' changes (offering services), and the willingness of patients to accept (which, in turn, depends on the quality of the counseling).

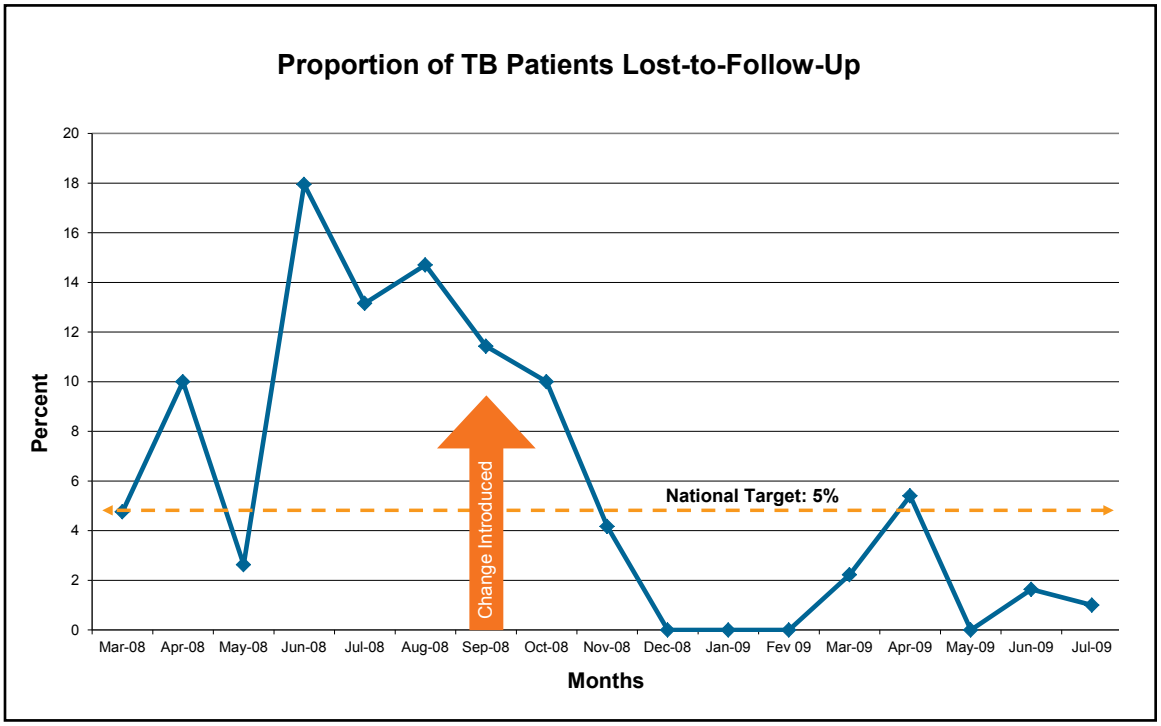
Figure 9



Objective #10: The lost-to-follow-up rate is kept below 5%

Because this is a national indicator, we were able to compute the monthly rate for the six months prior to the Collaborative. The average rate of lost-to-follow-up of TB patients was 10.5% before the introduction of changes and decreased to an average of 2.4% after (see Figure 10). In July 2009, the last available measure, only 1% of patients were lost-to-follow-up. Variations in this indicator are explained by the small numbers of patients in the denominator. For example, two patients lost to follow-up in April 2009 suffice to produce an increase of this rate above 5%.

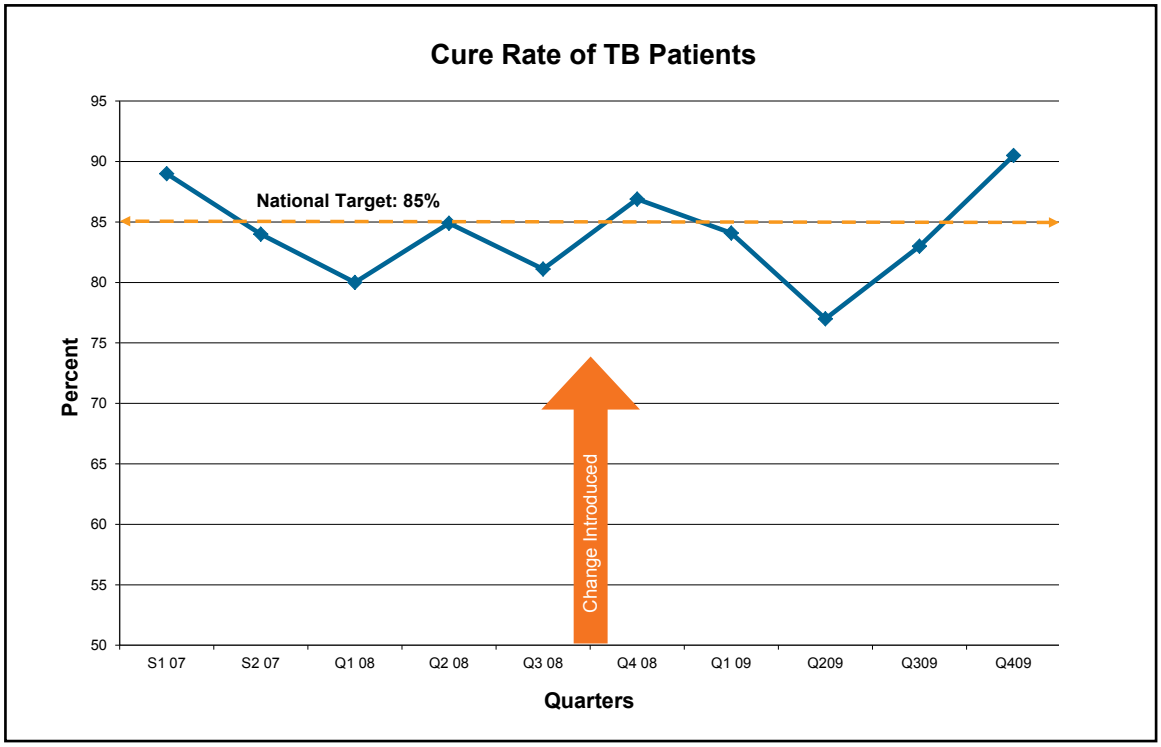
Figure 10



Objective #11: At least 85% of TB patients are declared cured after 6 months of treatment, according to the norms of the PNT

This indicator is measured quarterly on a cohort of patients who have completed their treatment. Prior to the Collaborative, the average cure rate of TB patients was 83.8%; following the introduction of changes, a slight increase in the average cure rate was observed, 84.3% (see Figure 11). In the fourth quarter of 2009, the last available measure, the cure rate was 90.5%. The overall trend is positive, but the rate has not stabilized yet above the national target of 85%.

Figure 11



Challenges

Although the terms of reference of the teams were very detailed and communicated to all team members, the best use of their expertise was a challenge. For example, some issues raised during the initial meetings, such as the added value of the physical exam, the rationale for doing a third sputum smear when the first two are positive and the sampling method for the quality control of sputum smears remained unanswered. One reason is the limited availability of the TB expert team during the meetings of the Collaborative. However, they were kept informed through the sharing of meeting minutes and regular phone calls.

Maintaining the focus of the improvement effort across a diverse group of professionals scattered in different locations was a challenge. Many competing priorities placed a burden on professionals, who could not always attend the learning sessions. Some members of the core groups were not always available to address some of the issues discussed by the QI teams during learning sessions. In the future, it is important to explain to leaders the level of commitment that is required.

Establishing the monitoring system took a very long time, as well as implementing some changes that were discussed by the teams (without any specific reason other than a lack of time), such as the establishment of a centralized computerized database for real-time tracking of TB patients throughout the process of care and the assessment of the quality of TB counseling.

The biggest challenge to the QI Collaborative was the retention of information (indicators) that health personnel is supposed to send monthly to the DHMT, due to a conflict between the DMO and the staff, which explains the lack of QI data after July 2009.

Lessons Learned

No matter how detailed the planning of a QI effort is, the improvement dynamic in a complex system is difficult to predict and is always a source of learning. The TB Collaborative in Mbao highlighted several main lessons learned and how they can inform the development of a QI effort in Senegal or in a similar context.

Lesson # 1: Leadership matters, at all levels. The achievements of the TB Collaborative in Mbao would not have been possible without the dedication of local staff and their partners

at all levels. From the CHWs to the head of the national TB program, all played a role in the success of this effort, while FHI 360 staff was instrumental in providing the necessary technical and logistical support. The QI effort faced some challenges during a transition phase in the leadership of the Mbao district, quickly solved when the new chief medical officer filled the vacant position. Although the QI collaborative relied mainly on local providers taking the initiative, securing the support of their managers and leaders from the beginning was crucial. In Senegal, it meant involving the national TB control program.

Lesson # 2: QI never happens exactly the same way all the time. Although the Collaborative model is well described in key reference documents, its implementation requires adaptation to the local context. In Senegal, the coaching of QI teams presented the dual challenge of building coaching skills within managers and supervisors, and of carrying out regular coaching visits. Shortage of human resources and time led to an innovative way of coaching the teams through district-based meetings, while focusing the visits on selected facilities that needed it most. This will be particularly important for the spread phase of a Collaborative where the number of service delivery points will exceed the coaching capacity of the health system. Some key tasks of the Collaborative worked extremely well and created enthusiasm among health providers, such as flowcharting the care processes and suggesting changes (creating an opportunity to express their ideas).

Lesson # 3: Measurement influences performance and improvement. The relationship between a change and an improvement was difficult to interpret, for three key reasons:

> First, the achievement of many improvement objectives requires full agreement or cooperation from the population of patients, who face multiple challenges in their daily life. As a result, the focus of the improvement effort shifted from the internal quality of the care delivered through a provider-client encounter (providers' performance only) to the retention of patients within the TB system of care. There is only that much that a system is able to do to ensure regular contacts with the patients.
>
> Next, we witnessed an improvement in performance before the final package of changes was formally identified and implemented. This is because the development of flowcharts, the discussion of the processes and the reminders of the standards to the health workers influenced their work. They all started to pay more attention to the various processes of care for which their knowledge and skills were not the issue.
>
> Lastly, the implementation of the change package is not completed at one formal date. It takes time to implement a change, to ensure its consistent implementation

over time, and to spread its implementation to all service delivery units. This is why we cannot conclude definitively that some changes did not produce an improvement (effect of the CHWs on the screening rate) or to predict how long one has to observe performance before concluding that a change is not effective.

Lesson # 4: Local ownership of a new method depends on consensus building. Decisions made at each step of the Collaborative effort are the results of a consensus among team members, sometimes after long hours of discussions. For an external audience that has not been part of this process, some of the decisions (whether an improvement objective, an indicator, or a change) might seem different from their perceptions of what the priorities should have been and their own preferences. The success of a QI process (using the Collaborative model or not) relies on the ownership of the service providers at the most peripheral level of the system. If properly guided by an expert, the QI teams will focus on issues and changes that make a real difference to the health of the patients. QI is not a specific solution to a specific problem at a given time; it is a new way of working that must be integrated in the day-to-day activities.

Lesson #5: Investment in coaching yields benefits. The replacement of coaching visits with coaching sessions increased the cost-efficiency of the coaching system while maintaining its effectiveness. The coaching visits were customized to the needs of the QI teams identified during the learning sessions and the coaching meetings. If, during the coaching meeting a problem could not be addressed, a specific coaching visit could be planned or linked to the next supervision visit of the facility, hence focusing on-site coaching on those facilities/teams that needed it most. Furthermore, the most often cited benefits of coaching visits are the intangible results such as motivation of the staff, team spirit, increased confidence and self-esteem, and the development of a culture of quality. These results are hard to measure, but should not be underestimated as a factor of success for the Collaborative and the sustainability of a QI dynamic.

Finally, a somewhat "hidden" benefit of the coaching system is for the coaches themselves to become more aware of the practical issues that the QI teams/health providers face in their day-to-day work. Because coaches usually have a managerial responsibility, they can contribute to addressing causes of issues that are beyond the control of the QI team. It is easy for a manager to focus on what should happen (the standards) and be disconnected from the reality of its implementation challenges.

Conclusion and Next Steps

The presentation of Mbao results to the Ministry of health and its key partners demonstrated the feasibility and value of structured QI efforts and explicit QI models, but it also raised the issue of the institutionalization of QI within Senegal health system, creating new opportunities for strengthening the role and capacity of the National Quality Program and addressing sustainability issues of QI efforts to benefit both national programs and health systems strengthening in Senegal. After the first experience with a QI Collaborative in Senegal, the Senegal leaders of the health system committed to:

- Maintaining the improvements in Mbao district and keeping the monitoring system, coaching visits and learning sessions while extending the changes to all TB service delivery points in Mbao district.
- Replicating the TB improvements and spreading the QI dynamic in five additional districts of Dakar medical region, with a leading role for the Mbao staff.
- Starting a structured QI effort for HIV/AIDS services, with voluntary counseling and testing as an entry point, in five districts of the Dakar Medical Region.

FHI 360 will continue supporting the Ministry of Health in its effort to strengthen its health system and improve service quality.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