IMPROVEMENT OF DISTRICT HOSPITAL SERVICE SYSTEM TO INCREASE TREATMENT ADHERENCE AMONG TUBERCULOSIS PATIENTS IN PAKISTAN

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ABSTRACT

Treatment adherence is an essential factor to measure the tuberculosis (TB) treatment success rate. This study aimed to improve the hospital service system in order to increase treatment adherence among TB patients at Rawalpindi District Hospital, Pakistan. A quasi-experimental, one-group, pretest-posttest design was used. The intervention applied concepts from the Chronic Care Model (CCM). The study sample included 99 new TB patients registered at the TB clinic of Rawalpindi District Hospital during February and March 2009. Structured questionnaire was used to collect the data for three variables: quality of hospital service system; patient satisfaction; and treatment adherence. The posttest data were collected after 6 months implementation of improved hospital service system. A paired t-test was used to examine the changes over time.

Significant improvement was found before and after the intervention in almost all items but particularly in friendly behavior of doctor (6.1% vs 23.2%), direction boards to guide patients (5.0% vs 36.4%), reduced waiting time (4.1% vs 50.5%), individual attention to patients (2.0% vs 36.4%), providing information about disease to the patients (2.1% vs 52.5%), and time spent by the doctor to discuss the problems (2.1% vs 64.6%). Quality of hospital service system was increased due to increased accessibility, counseling, and supply of drugs and logistics. Patient satisfaction was increased due to improvement in tangibles, reliability, and empathy. The overall mean scores of quality of service system, patient satisfaction, and treatment adherence of TB patients significantly increased 6 months after intervention ($p < 0.001$). Only two individual items of treatment adherence, i.e., living in a cross ventilated room and visiting a hospital for follow-up, did not significantly increase ($p > 0.05$). In conclusion, the findings suggested that improving the quality of the hospital service system by applying the concept of CCM increased treatment adherence among TB patients at Rawalpindi District Hospital.

KEY WORDS: TB PATIENTS/ HOSPITAL SERVICE SYSTEM/ PATIENT SATISFACTION/ TREATMENT ADHERENCE/ PAKISTAN

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LIST OF ABBREVIATIONS

AFB	Acid Fast Bacilli
CDC	Centers for disease control and prevention
CDR	Case Detection Rate
CCM	Chronic care model
CDR NSS^+	Case detection rate, sputum smear positive
DOT	Direct observation of treatment
DOTS	Directly Observed Treatment Strategy
DH	District Hospital
DR	Default Rate
DST	Drug Susceptibility Test
HFH	Holy Family Hospital
ICCC	Innovative Care for Chronic Conditions
ISO	International Organization for Standardization
IOM	Institute of Medicine
MDR-TB	Multi-drug resistance TB
NTP	National TB control Program
OPD	Outpatient department
PPM	Public Private Mix
RGH	Rawalpindi General Hospital
SAT	Self administered treatment
SCR	Sputum conversion rate
SD	Standard deviation
TB	Tuberculosis
TSR	Treatment success rate
WHO	World Health Organization

CHAPTER I

INTRODUCTION

1.1 Rationale and justification

Tuberculosis (TB) is a bacterial disease caused by mycobacterium tuberculosis. It is the leading killer as compared with the other communicable diseases. The data on the prevalence of TB shows that almost nine million people get infected with TB every year and almost two million deaths occur due to TB and its related diseases throughout the world. (1) The disease was declared as global emergency because it was re-emerged since 1980. Multi drug resistant TB posed the most serious threat on the TB control programs and there was an immediate need to improve the treatment strategies for its prevention. WHO reported that 1.7 million people were dead due to TB and there were 9.2 million TB cases during 2006. The worldwide incidence of TB was at its peak during 2003-2004. The seriousness of the disease was further increased due to multidrug resistant TB (MDR TB) which constitutes about 5% of all the TB cases. There are 22% of MDR TB cases in the former Soviet Union in 2008 which were the highest rates of MDR TB among all countries in the world. The hallmark of TB is that 75% of all the cases are in the most economically productive age group (15 – 54 years) which are found in the developing countries. (2)

TB is among the top ten causes of global mortality and morbidity and 26% of preventable deaths occur due to TB. (3) Almost 20% of global burden of the disease occurs in India (4). The common reasons responsible to increase the problem with drug resistant TB, poverty, weak public health systems, and increasing prevalence of HIV/AIDS. While poverty, malnourished people, and immigrants are main sufferer of the tuberculosis in western countries. (5) It is estimated that one billion people will become infected with TB and six million will die between years

2002 and 2020. So TB constitutes a growing challenge for the public health development.

Surveillance and survey data shows that in 2006 the incidence rate of TB (363 per 100,000 populations per year) which is the highest in African region while the lowest incidence rate (37 per 100,000 populations per year) is in American region. Incidence of smear positive cases is also highest (155 per 100,000 populations per year) and mortality rate due to TB is also highest in Africa region. Every year 80% of newly diagnosed TB patients live in the twenty two high burden disease countries. Almost half (48%) of the new cases found every year in the most populated Asian countries like Bangladesh, China, India, Indonesia, and Pakistan. (6)

In the Eastern Mediterranean Region, Pakistan contributes 43% of the total aggregate of the disease and it is on the eighth position of twenty two highest disease burden countries. The incidence rate as reported by the WHO for the smear positive cases is 82 per 100,000 population per year and 181 per 100,000 population for all forms of tuberculosis. Every year there are more than 250,000 new cases of TB that constitute 5.1% of total country's disease burden in Pakistan. In 2005 total estimated new cases of TB were 286, 291, and number of people living with TB are 468,460, number of new smear positive cases are 128,724, population under DOTS coverage 100%, while detection rate under DOTS is only 37% and treatment success rate is 82% .(7)

Pakistan spending 0.7% of total GDP on healthcare during 2002-2003 which is much less as compared to other countries of the region. The priority diseases are malaria, TB DOTS program, and HIV/AIDS. TB DOTS program is implemented in 47 districts and is under progress to achieve 100% coverage. The indicators shows that during 2004 the case detection rate was 27% and treatment success rate was 75% which were a lot behind the targets set by the WHO under TB DOTS program. In order to achieve 70% case detection rate and 85% treatment success rate, the main strategies to reduce the new TB cases and decrease the burden of disease are to provide technical assistance and health education besides chemotherapy provided at every treatment center under TB DOTS program. TB control program was approved

Rs.66.733 million for 2000-01 to 2003-04 but keeping in view of the severity of the problem it was revised at Rs.159 million after receiving an additional allocation of Rs.121 million. (8)

Slow progress for the expansion of TB DOTS program is attributed to many difficulties. The main hurdles are the healthcare infrastructure which is not capable to provide the sophisticated TB case management facilities under DOTS strategy. There is lack of skilled and trained staff to provide these facilities. Moreover the structure of primary health care services in urban areas is not integrated with TB control program and the treatment provided in the urban areas has no similarity with universally accepted TB DOTS program. Due to these reasons the TB patients are attracted towards the private practitioners for their initial treatment. (9)

TB control in Pakistan has some serious shortfalls. Pakistan reveals that the program is not vigilant enough to follow up TB cases till they complete the treatment and get cured once they are detected. Our research substantiates the fact that chronic interrupters/defaulters and relapse cases have a higher tendency to develop resistance than the normal or newly smear positive case. Periodic surveillance to monitor the severity of the situation is rare and tracing resistant cases or follow up of defaulters/relapse cases has remained largely out of focus. (10)

Rawalpindi District is situated close to the capital city Islamabad, with total population of about 4.1 million. Urban rural ratio is 49:51. It was reported that 956 patients were registered in three tertiary care hospitals i.e., Rawalpindi General Hospital (RGH), Holy Family Hospital (HFH) and District Hospital (DH) from July 2006 to December 2006. 45% were male and 55% were female. The percentage of new smear positive cases was 4.2%, new smear negative cases was 58%, relapses was 2.8% and extra pulmonary cases were 35%. Case detection rate for all cases was 51%, while case detection rate for smear positive cases was 4.7%. Figure 1 shows trend analysis for Rawalpindi District during the period of quarter 2, 2007 and quarter 1, 2008. Case detection rate for sputum positive cases during this period was 69% at the

beginning (quarter 2, 2007) while it is decreased to 60% by quarter 1, 2008. Sputum conversion rate remain static at 83% at the beginning till quarter 1, 2008. Treatment success rate was 94% at quarter 2, 2007 while it is 92% by the end of quarter 1, 2008. Default rate shows marked increase from 1% to 10% during this period. These data are much alarming because on one hand case detection rate is increased but case holding capacity is not improved.

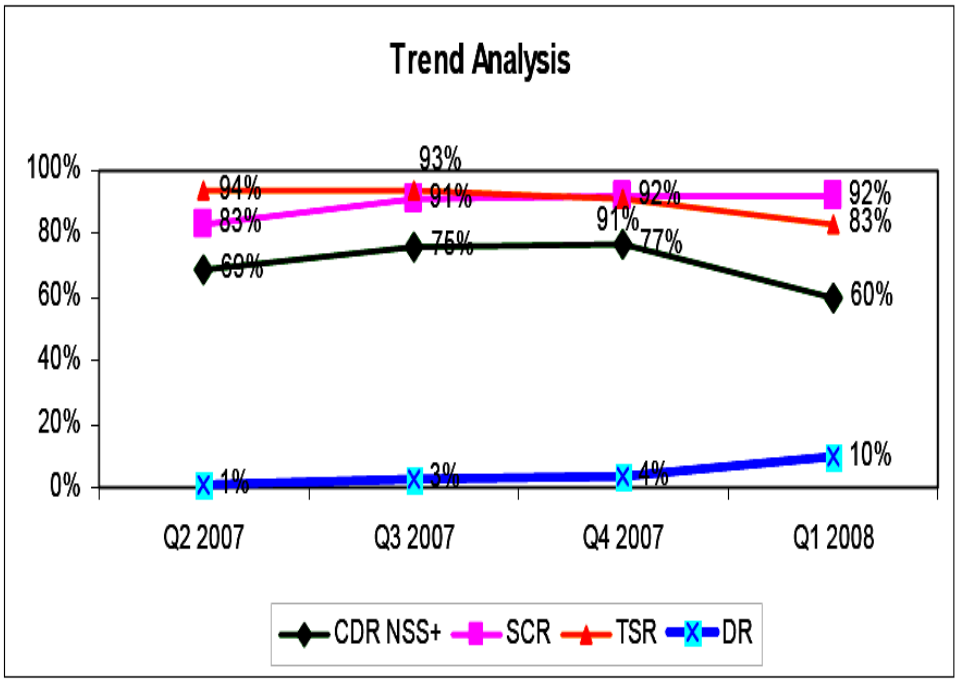

Figure 1: TB situation Rawalpindi District

Source: Provincial TB control program, Punjab, 2008

Measures should be done to improve the case holding capacity through the increased accessibility, deputing experienced and motivated staff for the management of TB patients and by improving the hospital services. Non compliance to prescribed TB treatment is responsible for the development of multi drug resistance TB (MDR TB) leading to increased mortality and morbidity. MDR TB is a grave condition not only at individual level but at the community level also. (11)

Adherence to TB treatment means that patient is required to complete the course of treatment as recommended by the physician and to take full dosage of anti-

TB treatment until he/she is declared as cured or treatment completed. On the other hand non-adherence to TB treatment is if a patient does not take the anti-TB drugs regularly for the entire length of course or stop taking drugs before he/she is declared as cured or treatment completed by the physician. It is noted that among many other problems for the management of TB, increasing non-adherence to treatment by the patients registered with the TB control program is very important to deal with. (12) Adherence to TB treatment which is manifested in terms of treatment interruption or discontinuation remains a major issue for National TB Control Program in many developing countries. Patients who remain on treatment continue to have problems with adherence. To ensure treatment adherence strategies coupled with quality assurance (improve access, availability, skills and communication) are important. In case a patient completes the full course of TB treatment, the treatment success rate will be increased automatically. Poor adherence not only decreases the treatment success rate but reflects that weakness of healthcare system to provide good standard facilities for the management of TB patients. (13)

TB control programs use to measure treatment adherence as an indicator for the success rate of the program. Decrease adherence means that the TB control program is not working successfully and vice versa. The author identified two common reasons associated with noncompliance of TB treatment. Firstly delay in the initiation of the treatment; it means start from the early symptoms until getting the diagnosis and starting treatment. This situation arises when the patient has lacking valid information about TB, effect of social stigma, difficult or inaccessible treatment and in many cases patients prefers to consult private practitioners due to any valid reason. Secondly the patient tries to hide the disease from the community and even to the family members also. It happens due stigma associated with the disease, insufficient or lack of knowledge about disease and non-trust to the hospital treatment. (14)

In order to improve treatment adherence direct observation of treatment (DOT) is considered to be an effective strategy. It has been implemented successfully

in various countries throughout the world. If DOTS can be implemented throughout the country with emphasis on all of its elements (ownership at every level, free availability of drugs, diagnosis by sputum analysis, supervision and monitoring, and reporting and recording system), improving the hospital services and engaging the private practitioners in TB control program, there is much certainty of reduction in the burden of disease. (15) In another study (16) it was observed that the default rate of TB patient is as higher as 50%. So the strategies for improving the treatment adherence should be on top priority. DOTS is proved as having high success rate and cost effective in various settings. Directly observed treatment is recommended as a key component in the DOTS strategy. Although it is proved as successful but some randomized controlled study by Volmink (16) and Walley (17) indicated that DOTS is surrounded with controversies in maintaining treatment adherence at different parts of the world where the DOT in spite of all its superiority is failed over the non-observed treatment for the improvement of noncompliance. Moreover one of these studies (16) that compared directly observed treatment (DOT) with self administered treatment (SAT) could not provide any significant effect on treatment outcomes of the TB patients who were under treatment at that period of time.

TB provides a comprehensive approach to measure the level of any health system. For the management of tuberculosis it requires diagnostic facilities like sputum analysis and x-rays, expert and well informed healthcare staff, un-interrupted supply of drugs, treatment and improving adherence of TB patients through chemotherapy and health education, community involvement for the social support of TB patients, and a good information system to follow up the cases. (18) TB programs are an important part of health systems, and contributing substantially to heath service system through investments in laboratory infrastructure, training of health staff, as well as through developing innovative service delivery strategies such as public private mix (PPM), and community-based DOTS in response to specific health systems barriers. Weak health systems cannot provide the same kind of services that are expected for effective TB control program. The composition of a health system comprises service delivery; workforce including clinicians, technicians, community

workers, and emergency staff; a well developed information system; logistics and supplies; budget; and leadership behind every activity and control. (19)

It is the responsibility of the healthcare providers and TB control programs to involve both the patients and community in the process of managing the TB patients. The principles set by the WHO for providing care includes: correct diagnosis and prompt treatment; chemotherapy should be based upon standardized regimens along with providing a treatment supporter for direct observation of treatment; routine follow up to access the efficacy of treatment; and supervision and monitoring. Good care of the TB patients is not only in the best interest of community but it may improve the quality of hospital services. As a conclusion it was recommended that TB control programs must involve patients and community to develop a better understanding upon the treatment and quality of care that is provided by the public hospital. (20)

As the incidence of chronic diseases is increasing due to multiple factors and it has imposed a significant challenge for healthcare institutions. Provision of good standard chronic care not gives the opportunity to improve the quality of service but it reduced the cost of care also. The difference between the TB and chronic disease is that TB is an infectious and communicable disease which is curable by anti-TB treatment while the chronic diseases are hardly cured but these are controlled not to get severe and develop complication. (21) The treatment of TB is relatively longer and a number of factors affect to complete the schedule of treatment. In this study the concept of chronic care model (CCM) for the delivery and monitoring anti TB treatment in the settings of Rawalpindi District Hospital will be applied. CCM is successfully adopted by many hospitals in US and Canada for the treatment of chronic diseases like diabetes, ischemic heart disease etc. (22)

The Chronic Care Model (CCM) is designed to meet the requirements of patients with chronic diseases. (23) The chronic care model uses a patient-centered approach in order to manage all those patients with chronic disease with increase their

motivation and information about the disease through healthcare team which is ready to meet the patients' need. The patient's central roles in the management of the chronic diseases lead the researchers' and policy makers to focus the consumers as an agent for the improvement of the quality of hospital services. In this situation the patients play a dual role for an effort to improve the quality of the services. Firstly the patient participates in the process of the care provided to them; secondly the patient is the agent to evaluate the care they receive. Involving the patients in the care process ensures the improvement of the quality of the healthcare system. (24)The multi-disciplinary approach of healthcare implies that the same care is being provided by using different approaches. Sometimes it is provided by different members of the health care team, whereas on some occasions it is provided by more than one member which is included from different department to provide care for a long time. (25)

In conclusion it is evident that treatment adherence of TB patients remains a major issue for the TB control programs and requires a comprehensive approach to decrease non-compliance with the treatment. The main responsibility to increase treatment adherence lies to the healthcare providers who manage the TB cases. Directly observed treatment alone was proved to be not effective to increase treatment adherence. To achieve this target hospital service system needs to be improved with main focus on the healthcare providers. CCM is used as a tool to improve the hospital service system because it has been proven as a successful tool for the management of non-communicable chronic diseases in many studies.

1.2 Objectives

1. To apply the chronic care model for improving quality of hospital service system in order to increase treatment adherence of TB patients;
2. To compare quality of hospital services before and after improvement of hospital service system;
3. To compare patient satisfaction of TB patients before and after improvement of hospital service system;
4. To compare treatment adherence of TB patients before and after improvement of hospital service system.

1.3 Hypotheses:

1. Quality of hospital services for TB patients after improving hospital service system is better than before;
2. Patient satisfaction after improving the hospital service system is better than before;
3. Treatment adherence of TB patients after improving quality of hospital service system is better than before.

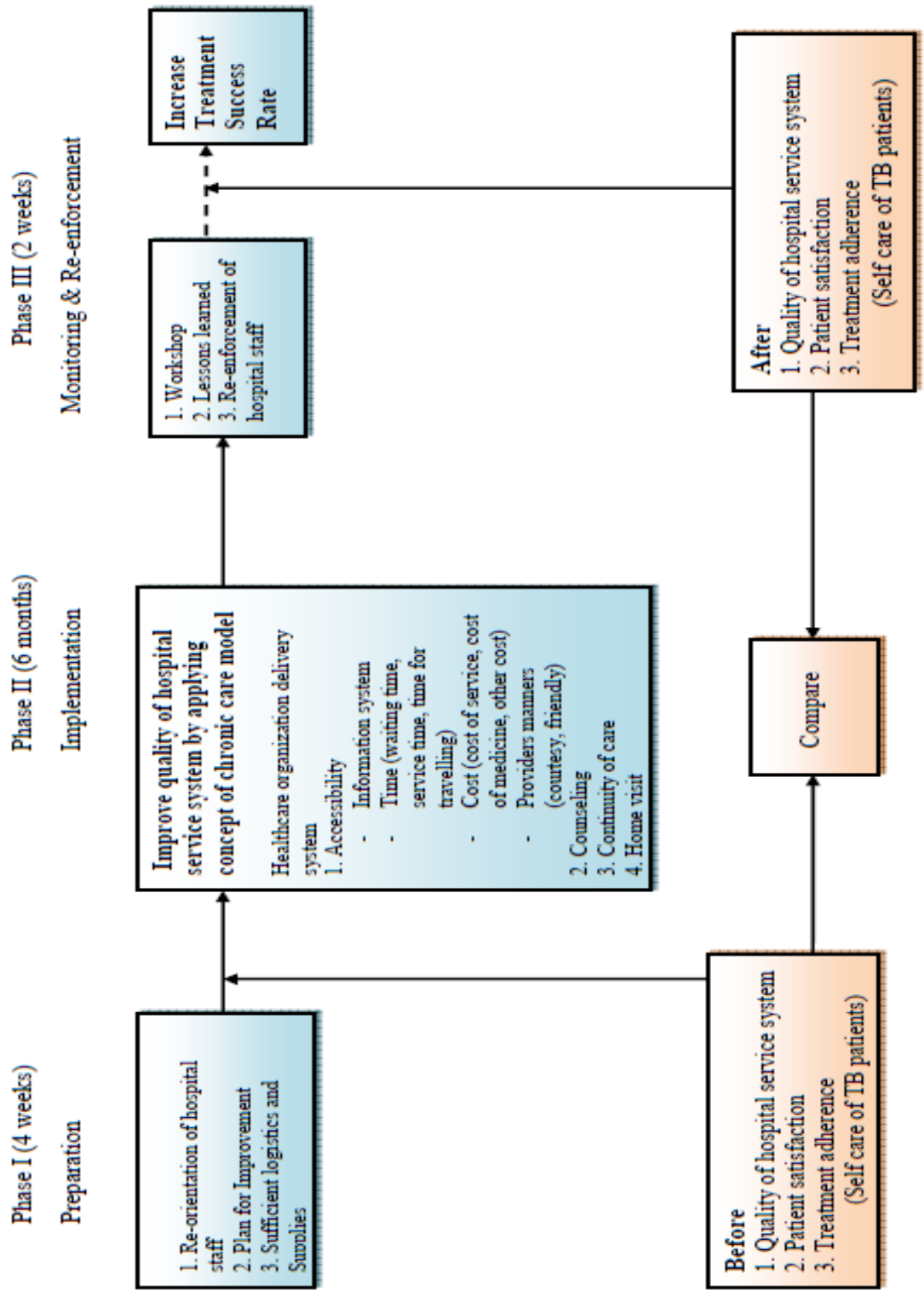

Figure 2: Conceptual framework for the improvement of hospital service system

1.4 Operational definitions

Health system refers to the arrangements of the government to deliver health care for the public and it comprises all organizations, institutions and resources.

Healthcare system: refers to the organized provision of medical, nursing and allied services through institutions, people and resources to the individuals.

Hospital service system refers to TB service system at Rawalpindi District Hospital which is a tertiary care level hospital responsible to provide complex curative care under DOTS, laboratory and other diagnostic facilities.

Quality of hospital service system refers to the standard process involved for the delivery of TB service at Rawalpindi District Hospital. Quality of the hospital service system is meant for the diagnostic and treatment facilities to TB patients that result in increase in treatment adherence of TB patients.

Improvement of hospital service system is the strategy and process of improvement of hospital service system for TB patients at Rawalpindi District Hospital that leads to better health through improvements in terms of accessibility, information system, continuity of care, home visits, waiting times, and drug management etc. required for satisfaction and increase in the treatment adherence of TB patients.

Accessibility is defined in the terms that how easy it is to get the TB treatment facilities according to the need of TB patients at Rawalpindi District Hospital. It may be explained in terms of information system, time (waiting time, service time and time for travelling), cost (cost of service, cost of medicine etc.) and the provider's manners. It is the capacity of individuals to obtain the same quality of service. It includes geographical accessibility, access to healthcare team and access TB clinic.

Counseling is defined as the process of providing informing and knowledge to the TB patients about the various aspects of treatment and prevention of TB by healthcare staff using better communication skills and listening carefully.

Continuity of care is defined as the ability to provide uninterrupted coordinated healthcare service for TB patients by the Rawalpindi District Hospital

overtime. It includes a good information system and timely reminders for follow up to the TB patients.

Home visit is defined as the regular contact of a healthcare staff of Rawalpindi District Hospital with the TB patient after they are registered for treatment.

Drugs and side effects is defined as the combination anti-TB medicines used for the treatment of a TB patient along with the particular side effects of each drug.

Sufficient logistics and supplies refers to the availability of anti-TB drugs, laboratory reagents, reporting and recording material etc. particularly for the intervention period of this study.

Acceptability is defined as the existing standard operating procedures of the Rawalpindi District Hospital that is available for the management of TB patients and to what extent these are acceptable to the TB patients.

Patient satisfaction is defined as the extent to which a patient perceives that the available services at Rawalpindi District Hospital are meeting their need and up to which extent.

Adherence to treatment is defined as the response of a TB patient to complete the treatment of TB and follow the instructions of the physician by using the ten items of self care practices during the treatment.

Non-adherence is defined as the patient's response to stop taking TB treatment at any time during the process of treatment.

Barrier is defined as a factor or group of factors that creates hurdle for TB patients either to start their treatment or continue it until its entire length of treatment.

Assessment refers to the evaluation of patients of the knowledge about TB, level of adherence of the TB patient, and other information through taking their medical history and personal information.

DOTS (Directly Observed Treatment Strategy) refers to the TB patients' complete two months therapy under the supervision by a treatment supporter.

New TB patient is defined as patient who has never had treatment for TB or who has taken anti-TB drugs for less than one month.

Pulmonary TB patient refers to patient with TB of the larynx, lung parenchyma or the tracheo-bronchial tree.

Extra-pulmonary case refers to TB patient without infection in the lungs the larynx, lung parenchyma or the tracheo-bronchial tree.

Cured refers to TB patient whose sputum results were positive for AFB at the start of treatment and smear negative in the last month of treatment.

Died refers to TB patient who died during the treatment of TB by any cause.

Treatment failure refers to TB patient who was diagnosed as smear-positive at the start of treatment and was smear-positive at month 5 or later during treatment.

Defaulted refers to interruption in the treatment of TB patient for two or more than two consecutive months.

Transferred out refers to transferring a TB patient from one diagnostic center to another diagnostic center with the request of the patient.

Treatment completed refers to 1) TB patient who was diagnosed as smears positive at the start of treatment and was smear negative but no sputum results at the end of treatment. 2) Patient was diagnosed as smear negative at the start of treatment and was also negative at the end of intensive phase of treatment.

Relapse refers to a patient diagnosed as sputum smear-positive who had been previously treated and declared cured or who had completed previous treatment.

CHAPTER II
LITERATURE REVIEW

The review of literature is organized into six parts. The first part is related to the introduction of TB in context of epidemiology, spread, diagnosis, treatment, and DOTS strategy; the second part theory and concepts for managing healthcare service system; the third part is related to hospital service system; the forth part is improvement of hospital service system. In the fifth part CCM and its application as a tool for the improvement of hospital service system is reviewed. Part six is related to patient satisfaction; and in part seven is related to treatment adherence of TB patients. In the eighth part research findings of related studies are reviewed.

2.1 Introduction of TB

2.1.1 Epidemiology

Tuberculosis is the disease caused by mycobacterium tuberculosis but occasionally it is also caused by Mycobacterium bovis and Mycobacterium africanum. The micro-organisms are also known as tubercle bacilli or acid fast bacilli. (26) WHO report 2009 (27) revealed that incidence of TB during 2007 was 139 per 100,000 population as 9.27 million new TB cases were registered globally. The estimated prevalence of TB cases during 2007 was 13.7 million (206 per 100,000 population). In the same year 1.32 million (19.7 per 100,000 population) deaths occurred by TB. In Pakistan the incidence of new TB during 2007 was 181 per 100,000 population, prevalence of 281 per 100,000 population, and mortality rate was 28 per 100,000 population. It was estimated that incidence of TB was highest at sub Saharan Africa where incidence was nearly 350 per 100,000 population in 2005. This incidence was almost twice than South-East Asian region which accounted for 34% of incident cases occurred globally.

2.2.2 Spread of TB

TB spreads by a person suffering from TB through droplet infection. The bacteria are spread in the air when a patient with pulmonary TB disease coughs, and sneezes. The people around that patient breathe these bacteria and become infected whereas the active disease occurred in an average of 10 percent people who are infected. The development of TB disease among these 10 percent depends upon some other factors like emotional stress, HIV infection, taking immunosuppressant drugs etc. (28) The bacteria enter the body through inhalation and spreads through the blood stream. TB is of two types: Pulmonary tuberculosis; it affects the lungs and occurs in more than 80% cases. Only pulmonary TB is responsible for the spread and the most likely victims are family members, friends and coworkers. The second one is extra-pulmonary; that affects other organs like kidneys, bones, intestine, spine and brain etc. (29) Children get TB infection from a family member who has smear positive pulmonary TB infection whereas smear negative patients are less commonly cause the spread. (30)

Centers for disease control and prevention (CDC) explains that symptoms of TB are in accordance with the organ where these bacteria start growing. If the bacteria grow in the lungs the common symptoms are cough for more than three weeks along with sputum which is sometimes streaked with blood, fever especially during night and at evening hours, pain in the chest, loss of weight, loss of appetite, and weakness or fatigue. When bacteria starts growing inside the body and there are no symptoms; this stage is called TB infection. After sufficient growth of bacteria the signs and symptoms appear; this stage is known as TB disease. (31)

In order to determine the risk of becoming exposed to tubercle bacilli, Rieder (32) explains that it depends upon incidence of infection in a community, the duration of having this infection and the frequency of interaction between an infectious person and a suspect per unit of time. The risk is highest among persons who live in the same house (relatives), or spend a long time in the same room (friends and coworkers) with a person having TB infection. Among the external factors responsible for the transmission of disease are severity of the source of infection and

duration of duration of exposure. The internal factors are determined by the integrity of the cellular immune system. The selected risk factors for tuberculosis are; referent (infection > 7 year past, infection < 1 year past), HIV infection, fibrotic lesions, silicosis, immunosuppressive treatment, hemodialysis, under weight, diabetes, living in smoky environment, gestrectomy and jejunoileal bypass.

Fight against tuberculosis is aimed at two levels. Firstly at community level where it is required to limit the transmission of TB infection by adopting preventive measures, so that the disease can be controlled at community level. Secondly at individual level where the patients were detected and treated promptly making the patient not spreading the disease to healthy persons and also restoration of their activities in the daily life. (28)

2.1.3 Diagnosis and treatment of TB

The diagnosis of TB is done with one of the following methods or with the combination of one or more methods. These methods are sputum smear microscopy, tuberculin skin test, radiological examination of chest, blood tests for TB detection and polymerase chain reaction. DOTS strategy recommends that TB diagnosis should be done by sputum smear microscopy for the examination of acid fast bacteria or Mycobacterium tuberculosis and if required and available chest radiography may be performed. (5) Chest x-rays are recommended for the patients who are not sputum smear positive. Sputum smear microscopy is preferred over the other methods of diagnosis in DOTS strategy because of cost effectiveness and cure rates of up to 95 percent even in poorest countries. Sputum smear microscopy is done initially for the diagnosis, then after two months of treatment to check the progress, and at the end of the treatment before declaring the outcome.

For the diagnosis of TB patients under DOTS strategy, sputum smear microscopy is the first step (figure 3). If all the three specimens of the sputum are positive, it will be a straight forward case of TB. In case only one specimen is positive, it requires an x-ray chest and clinical assessment to declare the person as TB

patient. For sputum smear negative cases an initial course of non anti-TB antibiotics is given for 5-7days. In case of improvement person may not have TB disease but if there is no improvement, it is advisable to repeat the sputum analysis again. Positive cases are diagnosed as TB patients meanwhile negative cases will need chest x-ray and clinical judgment to diagnose a case as having TB or not. (30)

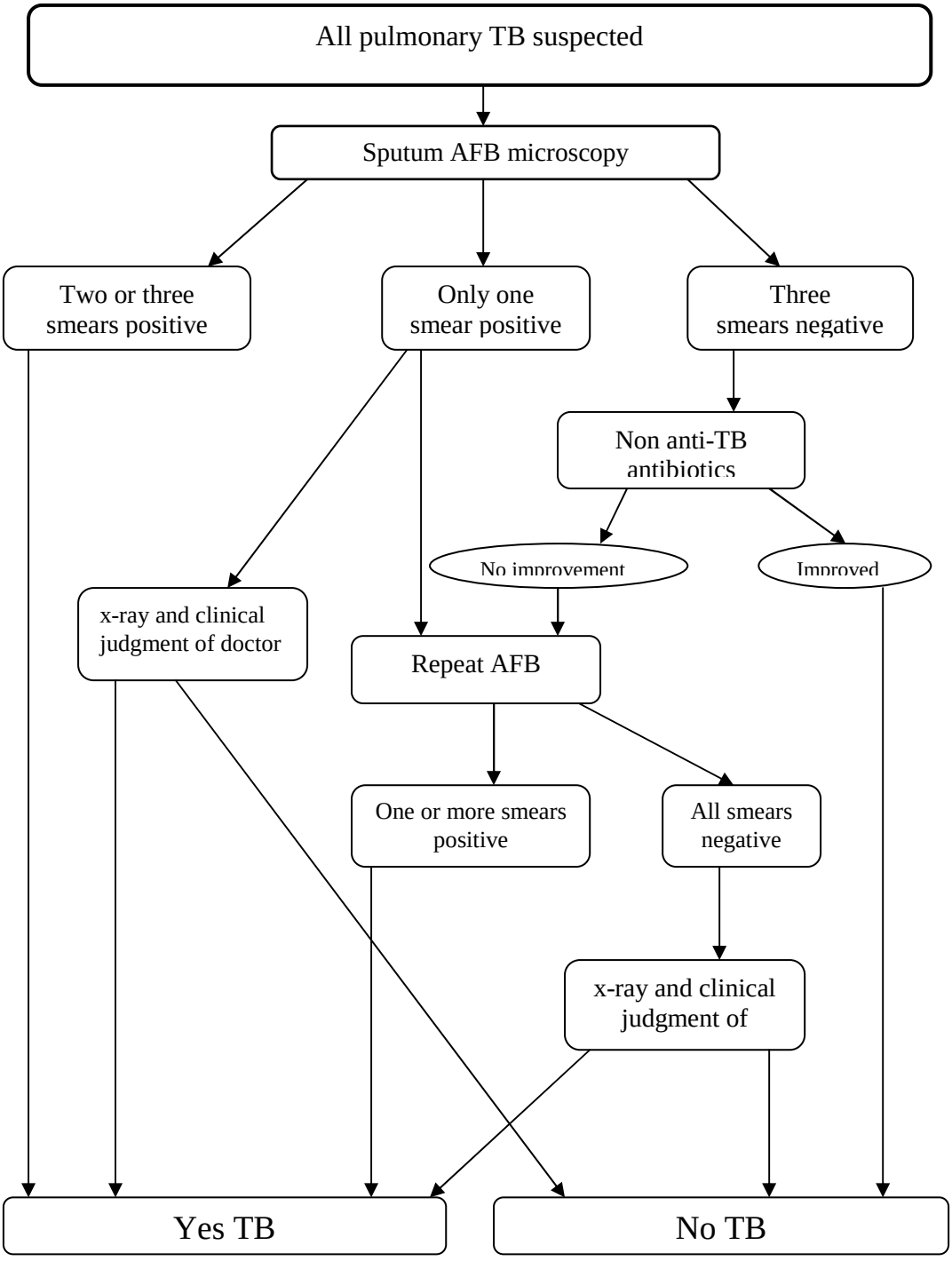

Figure 3: Diagnostic procedure for suspected pulmonary TB case.

Source: Treatment of tuberculosis, guidelines for national programs. (30)

The treatment of tuberculosis is carried out due two particular reasons. Firstly: to cure the TB patient from the disease and secondly: to reduce the spread of mycobacterium tuberculosis to the healthy persons in the society. It means providing

effective treatment to a TB patient until cure serves the purpose at individual and community level. Thus to achieve these benefits it is necessary for the patient to complete the treatment and for the healthcare system to supervise the TB patient until it cures. It depends on the patient's choice from where they want to get the treatment i.e from public hospitals or clinics or by the general practitioners. But the overall responsibility to supervise, monitor, and getting the results lies upon the healthcare system. Healthcare system should make sure that patients are getting adequate, appropriate diagnostic and treatment facilities. For successful outcomes not only there is a role of chemotherapy but other measures like educating the patient and community and providing basic knowledge about the various aspects of tuberculosis is also much important. (33)

The essential anti- tuberculosis drugs used for the treatment of TB are shown in table 1. These drugs have bactericidal, sterilizing and ability to prevent resistance properties. Isoniazid and rifampicin are powerful bactericidal, while ethambutol and thiocetazone are used in combination to prevent the drug resistance in emergency cases. The WHO recommends that the chemotherapy many be given daily as compared to the weekly basis. In twice weekly regimens misses a dose of tablets therefore the risk of treatment failure is increased. Thioacetazone is discouraged by the WHO due to severe toxicity particularly in patients with HIV. (30)

Table 1: Essential anti-tuberculosis drugs

Essential Drug (Abbreviation)	Recommended dosage (dosage range) in mg/kg	
	Daily	Three times weekly
Isoniazid (H)	5 (4-6)	10 (8-12)
Rifampicin (R)	10 (8-12)	10 (8-12)
Pyrazinamide (Z)	25 (20-30)	35 (30-40)
Streptomycin (S)	15 (12-18)	15 (12-18)
Ethambutol (E)	15 (15-20)	30 (20-35)
Thioacetazone (T)	2.5	Not applicable

Source: WHO. Treatment of tuberculosis. Guidelines for national programs. (30)

The chemotherapy for tuberculosis includes: isoniazid, rifampicin, pyrazinamide, ethambutol and streptomycin as first line standard regimen. The first line drugs are essential for the treatment of tuberculosis. There are two treatment categories (table 2): category I is recommended for new TB patients those never received anti-TB treatment are treated in category I. Category II: for those TB patients who were previously treated with anti-TB drugs. It is also recommended to use fixed dose combination (FDC) for the treatment of both categories of the TB patients. Fixed dose combination drugs have a few benefits on the individual drugs like patients feel convenience on taking FDC, there are less prescription errors, and easy for the patients as there is no selection which tablet need to be taken at the particular time. (19)

In Pakistan the treatment regimens are in line with international standards and recommendations which are shown in table 2. Rifampicin is an essential anti-TB drug which is bactericidal and bacteriostatic but the development of resistance is very common for rifampicin if it is not used regularly. So the strategy in Pakistan is to directly observe the TB patients taking rifampicin in the treatment regimen which is also the recommendation of WHO. For directly supervision of TB patients there is network of lady health workers throughout the country especially in the rural areas. Moreover community volunteers and trained family are also available for direct supervision. National TB control program in Pakistan recommends and use high quality fix dose combination tablets of HRZE and HR. NTP recommends that only those FDG's should be used who confirms a standard level of bioavailability of the rifampicin. Moreover the use of rifampicin and streptomycin is prohibited for the cases who are not diagnosed as TB patients by all means. (34)

Table 2: Recommended doses of front line anti-tuberculosis drugs for adults and children

	REGIMEN	
CATEGORY	Intensive phase	Continuation phase
I (new cases)	2 months of HRZE	6 months of HE
II (retreatment cases)	2 months of SHRZE plus 1 month of HRZE	5 months of HRE

H=isoniazid; R=rifampicin; E=ethambutol; Z=pirazinamide; S=streptomycin.

Source: Treatment of Tuberculosis: Guidelines for national programs.

2.1.4 Directly observed treatment strategy (DOTS)

The World Health Organization recommends directly observed treatment strategy (DOTS) strategy for the treatment of TB patients. The aim to use DOTS is to prevent the spread of disease due to mycobacterium tuberculosis and in this way achieving success to cure the patients and thus the illness and deaths related to TB can be controlled or prevented. It is advisable to use fixed dose combinations in active cases of TB. This strategy is part of Global Plan to stop TB transmission from 2006 - 2015. This strategy is helpful for detection of new cases and treatment of latent TB infection with isoniazid. DOTS prevents the transmission of disease, possible development of multi drugs resistant TB and other complications of TB. (35)

As declared by the WHO, DOTS as the most effective strategy available for controlling the TB epidemic today. It has five components: commitment at all levels to support the activities carried out for TB control; sputum smear microscopy is used to diagnose the symptomatic cases who report to any healthcare facility; treatment regimen must be standardized and continued for six to eight month to the sputum smear positive cases and the treatment must be directly observed for initial two months; supply of all essential anti-TB drugs regularly and uninterrupted; reporting and recording system that should be standardized. Reporting and recording system is

helpful to access the results of the treatment of each patient. The last four components are related to the commitment from the government for their effective progress. The government must show the commitment at policy formulation, allocation of sufficient budget and availability of human resources in order to ensure that TB control is among the priority diseases in the policy. (28)

Directly observed treatment (DOT) is essential part of DOTS strategy. It is referred to observing the TB patients at the time when they take the drugs. It is necessary to directly observe the patients for first two to three months of the intensive phase of treatment. During intensive phase of treatment rifampicin is always included in the therapy which is the most important medicine in the drug combination. If the medications were not regularly there is all the chance to develop multi drug resistance. It is never required that the TB patient gets resistant against this drug. So direct observation minimizes the chance of irregular ingestion of the drugs and the responsibility of the patient to adhere with the treatment is also shared. It is the responsibility of all the institutions attached with the treatment of TB to provide treatment supporter for the TB patients. Treatment supporter can be anybody who is willing, trained, responsible, acceptable to the patient and accountable to the TB control services. (28) In order to ensure treatment adherence among TB patients it is necessary to observe the patients directly at the time they ingest drugs. It not only helps to increase treatment adherence but it is a source of motivation for the patients to continue the treatment until cure. In other words directly observed treatment prevents the development of multi drug resistance by increasing the treatment. (30)

Ibrahim Khan et al. (10) recommended that: a) Immediate policy steps be initiated to standardize treatment regimen, universally implement DOTS and DOTS Plus in areas where MDR is highly prevalent; b) National commitment be made to accelerate detection, enhance cure rates and improve adherence and awareness among TB patients; c) effective partnerships be built for sustainable actions; d) Emphasis be focused upon capacity building, resources provisions and active case finding; e) Laboratories be equipped with all essential procurement required for MDR detection

at all fronts and; f) More clinical and community based research be conducted and periodic surveillance regarding MDR-TB be instituted.

2.2 Theory and concept of managing healthcare service system

2.2.1 Management concept

Management is the set of activities being carried out for the accomplishment of organizational goals. These activities are carried out through planning, organizing the resources, leading to influence the people to follow the directions, and controlling the organizational structure, its resources like human, financial and physical to achieve the desired goals. In management process individuals work together in an efficient way to successfully achieve the goals. (36) In the management process there is a chain of hierarchy and the persons on the top positions are called executives e.g chief executive officer, chief financial officer, vice president, chief operating officer etc. the difference between managers and leaders through a classic definition is “Leaders do the right thing and managers do things right”. (37)

2.2.2 Managing healthcare service system

It is the responsibility of the health systems to work for the betterment for the health of general public and take necessary measures in order to protect them from the extra ordinary burden of illness. As discussed in the World Health Report 2000, there are three fundamental objectives for the healthcare system of every country: 1) improving the health; 2) meeting the needs and expectations of the people; and 3) provide subsides in the healthcare services. It is the responsibility of the governments to provide affordable, accessible and equitable healthcare services to the people. But in many occasions these responsibilities are not met and healthcare system fails to respond to the expectations of the general public. In this situation the people get frustrated due to delays in the provision of services, prescription errors, unfriendly attitude of the hospital and decreased safety attached with the service system. (38)

WHO (39) defines “a health system to include all the activities whose primary purpose is to promote, restore or maintain health”. Improvement of health is required to get the improved health outcome and this improvement can be brought about by improving the essential elements of the health system. In order to improve the health systems, it is necessary to compare the performance in terms of what are the present achievements and how they are carrying out the described functions of the health system. WHO (39) explained that important components of a health system include: 1). Stewardship / governance / leadership: defining sector strategies, clarifying roles, managing competing demands. 2). Health financing: ensuring fair and sustainable financing, including financial protection. 3). Human resources: having a sufficient and productive workforce. 4). Information and knowledge: ensuring the generation and use of information. 5). Technology and infrastructure: ensuring adequate drugs, equipment, and infrastructure. 6) Service delivery: improving organization, management, and quality of service.

2.2.3 Principles and concept of improvement

The basic concept for the improvement of quality of services is to introduce an intervention that can change the previously working system and give better results. Every intervention is not an improvement. If it considered that intervention will bring about an improvement then it is required to test and make sure that particular intervention will improve the quality of care. Massoud et al. (40) explained four principles for quality assurance and quality improvement:

1) Focus on the patients: While designing the service improvement patterns focus on the needs and expectations of the patients and address them effectively in order to make the intervention more realistic.

2) Understand your work in the context process and system: Applying the Donabedian’s concept of inputs, process and outputs; create a good understanding and its working process in order to bring about improvement in the quality of services (figure 4).

3) Using data and testing of the intervention: Available data is used to analyze the problems and the process of the working system in order to determine whether the intervention will be successful to improve the quality of services.
4) Teamwork. In the center of everything lies the team working. It will facilitate in problem solving and improvement process.

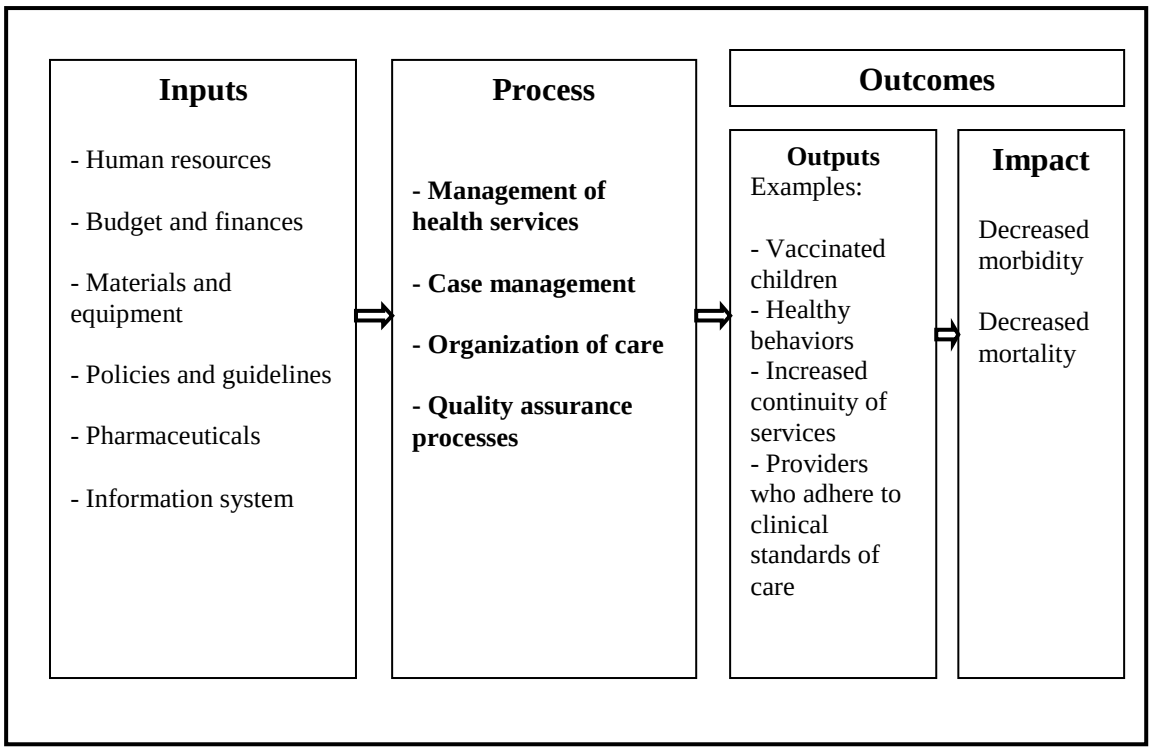

Figure 4: Systemic view of service delivery
Source: A modern paradigm for quality improvement (40)

2.3 Hospitals service system

Being the important part of every healthcare system, hospitals never received the remarkable attention from the policy makers and the researches. As an institution there is direct affect of health sector reforms on the hospitals. They are responsible for protection and improvement of health of people so they constitute an important element within the healthcare system due to many reasons: Firstly; as far the allocation and expense of budget is concerned, they receive more than half of the total healthcare budget. Many western European countries allocate about 50% and

more than 50% in former Soviet Union. Secondly; they lies at apex of the healthcare system, so the policies they adopt that determine the accessibility to the specialist services, have a major impact of the overall health care. Thirdly; the leadership develops from those who work in the hospitals on specialist level. Finally; using most modern and advanced technology, research and development in pharmaceutical area, and evidence based care contribute significantly in the health of general public. (41) On the other hand if the hospitals are unable to play their part in the improvement of people's health will not only their image and identity may be reduced but even be negative.

Hospital services and health care system are often used synonymously to discuss the care provided to the patients. Hospitals have a central role in any healthcare system but most often they fail to meet the genuine needs and expectation of the patients. Douglas et al. (42) argues that the important roles of the hospitals can be discussed on the basis of outcomes, services, and trust. Outcomes: hospitals utilize major part of the healthcare budget and other resources. The needed outcome against all the inputs is promoting the health and protecting from disability of the people. They are required to provide effective and efficient services to the patients. Health system has the responsibility to adopt the concept of continuous improvement for sustainability. Reducing the inequalities and services based on continuous improvement strategy are able to face the needs of the patients in the future. By this way they will be able to meet the future demands and needs of the patients. Services: Building the capacity of the physicians and healthcare staff bring about the improvement in service quality that meets the desire of patients. Hospitals needs to more accessible and flexible enough according to the needs of the individual patient. Services for chronic diseases and disabled need special attention. Trust: hospitals need to maintain the equity in the services to gain the trust and confidence of the patients.

The health system in Pakistan presents that secondary and tertiary care hospitals are located in big cities and district headquarters and accessible easily to the urban population and of the catchment area. The people living in rural and remote

areas mainly depend on primary health care facilities available in basic health units, dispensaries and lady health workers in their area. Major expenditure to the hospitals is an inequality for the distribution of budget because the majority of the population lives in the rural areas and thus they lack accessibility to the secondary and tertiary care hospitals. He concluded that the poor population in Pakistan lacking the access to a sophisticated care from the secondary and tertiary care hospitals. Low allocation of budget means that financial resources are making it difficult to get care services from public hospitals. Moreover poverty, malnutrition, difficult access and poor allocation of resources are responsible for increased population growth rate, and mother and child mortality rates in Pakistan. (43)

2.3.1 Assessment of quality of hospital service system

Assessment of the quality of hospital service system and patient safety is a priority in every healthcare system because the hospitals share the greater proportion of healthcare budget. It is more than 50 percent in the European hospitals. (44) Many strategies are explained in the literature to improve the quality of hospital service system that is discussed as follow:

Increase in financial, human and technological resources; financial reforms; and improving management style and competencies are used to treat more patients in short period of time, better use of resources and improving quality by increasing management responsibilities, or authority respectively. (45) Quality management system; Various European hospitals used the guidelines of International Organization for Standardization (ISO) to design quality management systems. (46) Benchmarking: in this approach information about quality is compared by using different methods that helps the healthcare providers to make decision for the improvement of quality. (47)

2.3.2 Systems approach to the hospital services

“System theory is the trans-disciplinary study of the abstract organization of phenomena, independent of their substance, type, or spatial or temporal scale of

existence. It investigates both the principles common to all complex entities, and the (usually mathematical) models which can be used to describe them". A system is composed of four parts: first; objects means the different variables exists within the system. Second; the different attributes and qualities related to the system and its objects. Third; the inter-relationship of the objects within that system. Fourth; every system works in an external environment. (48)

A system is like an organizational structure where various components are integrated together, remain interdependent, and interact regularly a unit to perform a task. The hospital can be considered as a system due to many reasons, e.g information system; system of human resources; system of logistics and supplies; and physical system of building. The system concept can be applied to the health care system and in order to identify the influence on the patient by a set of interacting components on the patient who has been admitted in the hospital. In this case body and comprises a system of an individual; patient and hospital staff together constitute an organization; and the system that is related to patient to the family; and a patient and community system. (49) Hospitals comprises a structure like any complex organization where systems concept was applied, thus hospital shows an excellent field to apply the principles and concept of systems. Moreover healthcare has the same operating system such as chain of hierarchy, command of unity, financial matters, and a traditional but sophisticated service delivery system. Due to this reason system theory is well suited to be applied in healthcare and hospitals. The area of interest for the application of systems theory may be to explore the innovations, change to bring about improvement and complexity of the service delivery system in the greater context of a case study approach. (50) Systems theory can also be viewed in the context of sociology and the hospitals being an organization lies within the socio economic, political and value systems of a community. To project the role of the social and health worker, systems theory provides a conceptual of understanding. (51)

The concept of systems theory is further explained by McKee. He argues that there are three underlying concepts of a system theory. First, its interaction with the external environment in order to secure necessary resources for its existence, and

progress. Second, like other systems hospitals being a complex organization have a chain of hierarchy that allows studying the hospitals at different levels of a system. Therefore the hospitals are considered working within the country's healthcare system and also within the social, political, and economical environment. Third, all the elements of the system are interacting regularly with each other and are interdependent. Hospital shows a complex structure of an organization because it has a series of sub-systems. So the impact on any hospital from other systems means that a change is required at any appropriate level. The figure 5 shows that hospital system due its complexity in the delivery of various healthcare services accepts the external and internal pressure to bring about a change at appropriate level to coup with its environment. A system approach can be applied for creating the linkages between various levels of the hospitals. The internal pressure for comprises effective and efficient usage of the hospital resources like human resources, finances and technological to improve the quality of the care and as a whole in the service delivery system. Among all the resources available to improve the quality of care, but the most important is the performance of the healthcare staff and clinicians. (41)

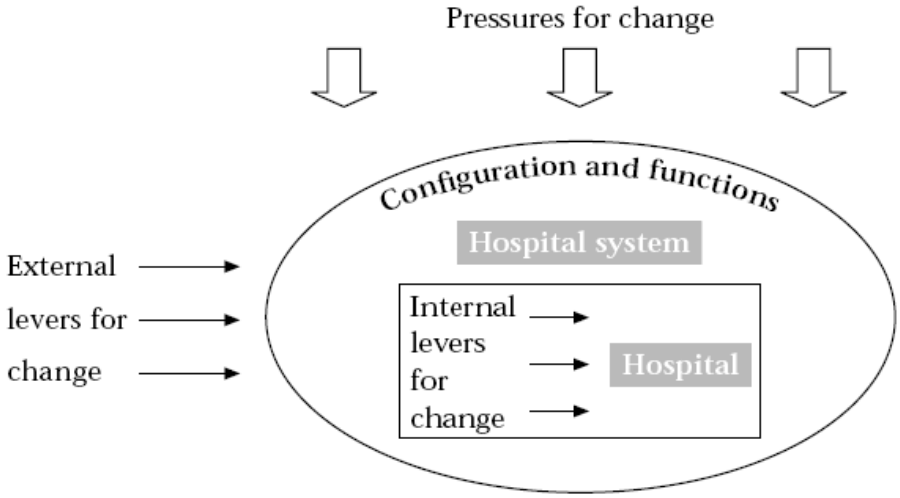

Figure 5: The hospital as a system: opportunities for change

Source: Martin McKee and Judith Healy; Hospitals in a changing Europe. (41)

2.3.3 Donabedian's Model

Healthcare organizations need to improve their performance continuously in order to meet the changing desires of their clients. The healthcare organizations are always under pressure for reducing the costs in one hand and improving the quality of the services on the other hand. It forced the managers' and healthcare experts to re-examine the performance. Donabedian's model (52) provides a system to measure the performance so that it can be improved quickly. This model is based upon three quality care dimensional approach to measure the performance i.e structure, process, and outcomes. Structure: it is related to the resources that were used by the organization to provide the health care services. This includes the physical resources such as facilities, equipment, and money, healthcare staff and clinician resources, and of organizational structure. Process: it is practical process of the service delivery which can be delivered by following the good manners or otherwise. It covers the activities of the clinicians while making a diagnosis and prescribing the treatment. It also includes the patient's who participate in the care seeking process. Outcome: outcomes are final impact of healthcare services on the patient's health. It is the improvement in the degree of patient's satisfaction, patient's knowledge about the disease and preventive measures, and change in the behaviour and reaction. (52)

In accordance with three components of his model Donabedian (53) described three approaches to access the quality of care. First approach is the measurement of the outcome of the services provided for management of the diseases and medical care to the patients. To measure medical care the indicators used are recovery from the ailments, extent to which normal functions are restored and the survival rate of the patients

Second approach is related to the process involved to carry out the particular services. It means the process itself is measured instead of measuring the outcomes. In this approach one do not take interest to see the results whether these good or bad but he just measures the way medical care is being provided. If the activities were following good standards' it is concluded that the quality of service or

care provided is also good whether or not the results do not show improvement in the patients health, morbidity or mortality.

A third approach is related to the input or structure for the provision of the services for care. So all the facilities and resources like qualification of healthcare professionals, medical staff, organization providing care, administrative setup and other institutions supporting the care process; are measured. (54)

2.3.4 Institute of Medicine's (IOM) six aims

IOM (55) identified six aims for the improvement of quality of healthcare. These aims are safety, effectiveness, patient centeredness, timeliness, efficiency and equity. This framework provides a basic structure not only to improve the quality but create the innovative performance that can win the patient's confidence and trust. Safety means the patients must be secured from all the avoidable injuries in the healthcare environment. Healthcare services are intended for safety of the patients at forefront. Effectiveness is developing a standard for the optimum use of healthcare facilities based on scientific knowledge. Patient centeredness: is to give equal respect and honor to every individual patient and respect the choice. Patients come from different cultural and societal context and to be respected for their specific needs. Patients are encouraged to take active part for making the decisions of their own health. They should be provided all the information about disease management in a friendly manner. While authoritative style may be used for enquiring about the signs and symptoms only. Timeliness: reducing the waiting time of the patients and those who provide the care by providing the services without wasting the time. Efficient: emphasis on reducing the waste. The healthcare system must be very conscious while the equipment be handled with care by the technicians, reduce the cost of drug supplies, wastage of land, inefficient usage of finances, and time also. Equitable: every patient or client must be dealt on the basis of equality and there should be no difference due to race and ethnic grounds.

To develop patient centered behavior takes relatively longer time as it requires continuous practice, continued education, and in-services to be effectively provided to the patients. The patient's centered approach encourages the patients to share their experience, knowledge, ideas, and views. On the other hand physician's role is like a partner who takes patients' emotional and social environments into account, and requires open-ended questions and mutual participation. This approach confirms the highest level of patient's satisfaction, improved outcomes without any significant increase in time and money from the provider. (56)

The cancer quality alliance applied the definitions of IOM's six aims (57) for the improvement of quality of care of cancer patient by understanding the shortcomings, how to overcome these shortcomings and achieve a quality cancer care. The aim was based upon the philosophy that "the ultimate test of the quality of a health care system is whether it helps the people it intends to help." According to the recommendations of IOM committee they provided a complete care history and follow up plan which was clearly written and explained to the patients completing their primary treatment. Healthcare providers used evidence based guidelines that were developed systematically and screening instruments for the identification and management of late side effects of cancer. The nurse provided education and information about the disease to ensure the delivery of culturally sensitive care. All this practical experience while applying the IOM framework, the results and quality of care was much improved.

Weber (58) states that there is always a gap between the expectations of the patients for the quality of care and those used to be delivered to the patients. The six aims to improve the quality of care highlighted these gaps in an effective way. It was recommended to use this framework in order to improve the quality of care for the cancer patients. (59) According to Pincus et al. (60) "IOM report on crossing the quality chasm" has been provided a comprehensive framework for the improvement in the quality of care within the US health care system. Using this framework quality of care for mentally ill patients can be improved. Mayberry et.al (60) there is gap between the actual care received and what is called good quality care. This gap is

much visible for certain segments of the population such as racial and ethnic minority groups. Pursuing the quality of care in context of IOM six aims, the improvements in quality of care can be well ensured.

2.4 Improvement of hospital service system

To improve the hospital service system multiple dimensions of quality of care are developed depending upon the various definitions for good quality healthcare services. Service quality is a multidimensional area and often difficult to define when it is required to be measured. Various authors used different dimensions to measure the quality of hospital services. Table 3 shows that Garvin (61) focused on eight dimensions, SERVQUAL developed by Parasuraman, Zeithaml, and Berry (62) incorporated five dimensions, Joint Commision on Accreditation of Health Organizations (JCAHO) (63) included nine dimensions, and Evans and Lindsay (64) developed eight dimensions as the following:

Table 3: Dimensions of quality of hospital services

Garvin's dimensions	SERVQUAL dimensions	JCAHO dimensions	Evans and Lindsay's dimensions
Performance	Tangibles	Efficacy	Time
Features	Reliability	Appropriateness	Timeliness
Reliability	Responsiveness	Efficiency	Completeness
Conformance	Assurance	Respect and caring	Courtesy
Durability	Empathy	Safety	Consistency
Serviceability		Continuity	Acceptability and convenience
Aesthetics		Effectiveness	Accuracy
Perceived quality		Timeliness	Responsiveness
		Availability	

The main focus of improvement of quality of service system is on the patient safety in order to avoid patients from the injuries occurs in hospital and lowering the costs, because it is evident that poor quality of the health services is considered as the wastage of resources that can be used for further improvement in the quality and patient's satisfaction. If healthcare system provides surety in the continuity of the services and care in curative, preventive and health promotion may be recognized as a quality healthcare system. From policy makers to general public everybody needs continuity of care at any suitable place. (65) Patient's perceptions about the healthcare delivery system are used to improve the quality of care. It provides useful information and identification of the issues related to the professional and interpersonal skills of clinicians while dealing with the patients as an outcome. (66) To measure the performance of healthcare system, researchers agree that patient satisfaction is the most sensitive indicator as compared to other measures like morbidity and mortality data, physician's peer review etc. which are considered as the routine of traditional measures to access the performance. (67)

There are three reasons why health professionals should take patient satisfaction seriously as a measurement. Firstly, the patient satisfaction is used as an outcome measure. It may provide useful information about the patient's behavior of taking treatment and follow up regularly and attending the follow up appointments with the same physician or changed. Secondly, patient satisfaction is used as a measure of assessment of communication style of the physicians. Thirdly, patient's experiences and expectations can be used to develop a choice between the alternative methods. (68)

2.5 The Chronic Care Model

Chronic Care Model (CCM) was previously applied for the management of non-communicable chronic diseases. It is the originality of this study that CCM is being applied as a tool for the management of TB which is a communicable disease. Chronic diseases such as heart disease, cancer, asthma, and diabetes also known as non-communicable diseases are diseases that stay for a long period of time and

generally slow progression. Due to increasingly spread of HIV/AIDS and similarity in requiring the comprehensive health care similar to those needed for diabetes, heart diseases and cancer, there is a wide consensus to view HIV/AIDS as a chronic disease in spite of the fact that it is a communicable disease. (69) Chronic conditions with the addition of HIV/AIDS and tuberculosis require the ability of the healthcare system to extend the treatment for a longer period of time. Patient education and changes in the behavior are in the center of the management as the aim is managing the disease rather to cure. An increasing burden of chronic diseases and tuberculosis need the attention of the policymakers to healthcare planners to bring about innovative changes for the delivery of services to the chronic patients in accordance with call for the World Health Organization. (70)

Due to significant rise in the incidence of chronic diseases throughout the World and the different approach to manage these conditions there is greater concern of the healthcare system to face this challenge. Chronic care model developed by MacColl institute for Healthcare Innovation was applied successfully for the management of chronic diseases like diabetes, heart diseases, cancer in many healthcare institutes in the America. World Health Organization in collaboration with MacColl institute of Healthcare Innovation adopted the CCM from a global perspective. The result of this collaborative effort was in the form of Innovative Care for Chronic Conditions (ICCC). The ICCC incorporates all the important components required for the management of chronic conditions. It covers all the aspects on various levels: at micro level; patients and families, at meso level; healthcare organization and community, and on macro level; policy and healthcare planners. This framework provides a strong and flexible base to redesign the healthcare system in order to meet the demands for the management of chronic diseases. (71)

Chronic diseases are a challenge for every healthcare system to manage the patients efficiently and provide cost effective care. Using a team approach and recognizing the central role patients is a successful strategy to help the patients. Chronic care model is proved to be effective in the way to manage chronic conditions as the characteristics are consistently shared by successful programs. It is indicated by

many surveys that if the healthcare systems continue to use the traditional ways of providing education to the patients, poor primary care linkages and referral system, their effectiveness will less as compared to the self-management support, population based approach, and improved community and primary care linkages. (72) Chronic care model represents a framework for the management of chronic diseases and improvement in the quality of care across many healthcare systems and organizations. (22) Over 1000 healthcare organizations and almost 500 community healthcare centers used the concept of chronic care model in order to bring about improvement in the system. Many of the organizations participated in the healthcare improvements activities organized for the use of chronic care model. (22)

2.5.1 Application of CCM for improvement of hospital service system

The CCM is a framework of six interrelated components; self management support, decision support, delivery system design, healthcare organization and community. The result of collective application of these components results in well informed and activated patients; and proactive healthcare team. (23) CCM improves the quality of service on one hand but also reduces the cost of health care. Taking the example of diabetes, based on the research findings of thirty two out of thirty nine studies it was found that effectively using the CCM, there was improvement in at least one process. To understand that chronic care model can reduce the costs, taking the examples of two chronic conditions (asthma and congestive cardiac failure) out of twenty seven studies, eighteen indicated that there was reduction in the total costs. It proves the effectiveness of chronic care model in the management of chronic diseases and reducing the total costs. (23)

In order to manage the chronic conditions successfully it is advisable to focus on team based care and readjust the priorities from acute conditions that are creating more complexity in rapidly fragmenting health care systems and over burdened with various incentives for the patients and healthcare staff. The results by the application of CCM show improved patient outcomes and improved physician productivity. (73) As described by Wagner et al. (74) that in order to get improved

outcome through the chronic care model it is necessary to use scientifically based clinical guidelines and other techniques, with focus on the self management support to the patients. Thus effective management of chronic conditions, best clinical decisions based upon scientific evidences and most appropriate medicines for the treatment provides improved outcomes. Using self management support is the patient centered approach that ensures the increased participation of the patients themselves and with the collaboration of healthcare team goal settings and planning for care can be decided as a part of treatment plan. Studies explored that positive relationship of CCM with patient centered approach. Therefore it is concluded that chronic care model is both evidenced based and patient centered. Both of these are properties of a complete healthcare system and not for individual practitioners. (74)

The CCM with its six components – healthcare organization, self management support, delivery system design, decision support, community, and information system – provides all the basic requirements for any health system to improve the quality of care for chronic conditions. The emphasis lies on a proactive healthcare team and the outcome is well informed and activated patients. Improved outcomes are seen when the combination of patients who take an active part in the management of the disease and care process and providers with all the available resources. (75)

Health care organization: Any healthcare organization needed to improve the system and quality of care for chronic diseases must be motivated and prepared for a change throughout the organization. For the treatment and long term management of TB, it is required to ensure that all the components of Stop TB Strategy are scaled up according to the plan with special attention to improve the access to the poor. (76) The top management of the organization should be involved in the process to bring about the change and improvement by setting the clear goals and strategies for improvement. In the public healthcare organizations improvement focusing on the increased accessibility and overall quality improvement ensures the utilization of services by greater part of community. Its role is much important in the urban communities. It was found in a study conducted in seven thickly populated

urban communities of Rawalpindi District that more than 80% of the TB patients used to consult the private practitioners at the initial stages of the disease. Private practitioners were lacking the standardized knowledge required in order to manage the TB cases. (77) In this scenario the responsibility of public hospitals and clinics becomes more crucial to come forward and take lead to provide standardized treatment to the TB patients. Poor allocation of budget and other resources, weak healthcare infrastructure to provide TB control services, inadequate and unskilled human resources, and irregular supply of anti-TB drugs and logistics are the main obstacles against the implementation and expansion of DOTS. (78) Table 4 summarizes the role of hospital management in order to promote the TB services and improve the quality using the concept of CCM.

Table 4: Change concept of healthcare organization

Healthcare Organization	Change concept
1. Engagement of healthcare organization or hospital administration.	1.1 Regular supervision from the administration and checking the progress. 1.2 All the healthcare staff is required to submit the progress routinely 1.3 Counseling on quality of care through experts of hospital.
2. Promote effective improvement strategies aimed at comprehensive system change	2.1 The chronic care model may be applied in usual practice.
3. Encourage open and systematic handling of errors and quality problems to improve care.	3.1The hospital administration point out the mistakes and lesson learned from time to time.

Source: Summary of Chronic Care Model (79)

Community: The traditional public health methods of surveillance, containment and prevention, and some of the newer strategies need to be employed to address TB control in today's multifaceted environment. It shows that controlling TB will require an intensification of collaborative efforts between public, private and community providers. In particular, the role of public health and health care workers in institutional settings is emphasized as it relates to shared community efforts. (80) In developing countries and especially high burden disease countries, it is required that TB control programs assess periodically the effectiveness of the strategies carried out for the management of tuberculosis. National TB control programs should extend their activities to the community level with identification of suitable treatment supporters, supply of anti-TB drugs, reporting and recording system with the consultation of community. (81) Table 5 shows the application of CCM to change concept and emphasize the mobilization of community resources to be used for patient's needs. It encourages patients to participate freely in those programs that are organized by community. (82)

Table 5: Change concept of community

Community	Change concept
1. Encourage patients to participate in effective community programs	1.1Identify gaps in clinic services and see if they are provided in the community. 1.2Link patients to community services that track outcomes. 1.3Follow-up with patients receiving community services
2. Form partnerships with community organizations to support and develop interventions that fill gaps in needed services	2.1 Establish a network to extend services into the community.

Source: Summary of Chronic Care Model (79)

Self-management support**:** The concept and meanings of self management support is empowering patients with chronic disease to make the decisions regarding the management of disease (table 6). While support is beyond providing the education but enabling patients to understand what is required from them and decide by their

own. So the self management support is recognizing the central role of patients in the management of their disease and giving them the responsibility to take active part for the improvement of their health. It is a collaborative effort by the healthcare provider and the patients to work together, identify the nature of the problem, make plan for the control of that problem by setting goals and treatment strategy to improve their health and care Thus the outcomes in the form of improvement in the quality of life will be related directly how much effective self management support is. (83)

Table 6: Change concept of self management support

Self management support	Change concept
1. Emphasize the patient's central role in managing their health.	1.1 Describe the patient's role in for completing course of TB treatment and following the instructions of health management team. 1.2 Duty of hospital staff is to provide all the necessary information about your disease, supply of drugs, and side effects of these drugs.
2. Use effective self-management support strategies that include goal setting, action planning and problem-solving and follow-up.	Use the 5 A's to work with patients: Assess patient's beliefs, behavior, and knowledge. Advise patients by providing specific information about TB and benefits of change. Agree on mutually set goals based on patient's confidence in their ability to change the behavior. Assist patients with problem-solving. Arrange a specific follow-up plan**.**
3. Organize internal and external resources to provide ongoing self-management support to patients.	3.1 Use effective stand-alone programs.

Source: Summary of Chronic Care Model (79)

Delivery system design: For an effective TB control program, the knowledge and expertise of the healthcare provider plays an effective role. The success of the TB control program and reduction in the incidence of TB depends upon effective diagnosis, treatment and better communication between diagnostic centers,

treatment centers and laboratory. (84) The population based care can be used centrally for a group of people or population and individually to reach all the patients in the population. This approach provides guidelines, data and new interventions for the care and to the outcomes that were affected by these guidelines. At individual level, this approach is much important because it reaches to all the patients in that population. (85)

Table 7: Change concept of delivery system design

Delivery system design	Change concept
1. Define roles and distribute tasks among team members	1.1 Develop the team as a unit and assign team members to tasks. 1.2 Receptionist: Maintaining que and taking care of patient's comfort. 1.3 Nurse/Dispenser: Recording of history 1.4 Physician: Diagnosis and treatment 1.5 Clerk: Record keeping
2. Ensure regular follow-up.	2.1 Develop a process for follow-up. 2.2 Tailor follow up to patient and provider needs. 2.3 Eliminate unnecessary follow-ups. 2.4 Schedule follow-up. 2.5 Monitor for missed follow-up. 2.6 Proactively reach out for those who do not attend follow-ups.
3. Give care that patients understand and that fits with their cultural background.	3.1 Solicit patient and family preferences. 3.2 Train staff in communication techniques with patients of different cultures. 3.3 Review understanding with patients.

Source: Summary of Chronic Care Model (79)

Decision support: This component advocates that the treatment plan for a chronic disease must be based upon proven guidelines which are supported by the clinical research. It makes the sense that healthcare provider had sufficient knowledge not only to offer an effective treatment but it confirms the patient's central role in the management of the disease and optimal care. This component is more useful if the

guidelines are based upon locally adopted evidence. It encourages the engagement of specialist doctors in the process of care. It needs to develop an approach to link with easy accessibility of the patients and provision of information scientifically. The results of a study carried out at Government TB Center, Rawalpindi aimed to explore the various factors that influence the decision making process at household level, concluded that for the success of any TB control program it is necessary to provide them health education, easy accessibility to care and treatment, healthcare staff must be expert, motivated and willing to work with TB patients. (86)

The findings of another study (87) suggest that health education and counseling did make an impact on the decision of a patient infected with TB to conform with a rational choice when provided with information and a supportive relationship about the consequences of TB infection. (88) In another study the main aspects mentioned by city TB control coordinators regarding patient adherence to treatment and to DOT in Sao Paulo are improvements in communications, relationships based on trust, a humane approach and including the patients in the decision-making process concerning their health.

Table 8: Change concept of decision support

Decision support	Change concept
1. Use scientifically proved knowledge and information	1.1 Use locally adapted evidence-based guidelines. 1.2 Provide written instructions on the back of treatment slip. 1.3 Date of next appointment should be written clearly
2. Specialist doctors available for primary care.	2.1 Engage specialists in process of care to TB patients.

Table 8: Change concept of decision support (cont.)

Decision support	Change concept
3. Use authenticated method for education	3.1 Use guidelines to access treatment adherence and factors related with it.
4. Ensure patient's participation in health related programs.	4.1 Encourage patients to ask for guideline-based care.

Source: Summary of Chronic Care Model (79)

Clinical information systems: This component of chronic care model emphasizes that an efficient clinical information system can improve the quality of care adopting the routine of sending timely reminders, in order to keep the patients well adhere with the treatment plan. The reminders should have a brief case history and plan of treatment. In case of TB and HIV patients who require long term chemotherapy to complete the course of treatment, developing a good interaction and relation will improve the compliance to treatment. Starting from initial diagnosis of the TB patients until completion of course, a regular follow up is very much required better outcomes. (89)

Table 9: Change concept of clinical information system

Clinical information system	Change concept
1. Send reminders well in time	1.1 Update reminders list on daily basis.
2. Support the patients for planning the care	2.1 Provide historical information to patients in order to develop a care plan.
3. Information about care is discussed with patients.	3.1 Inform clearly about next appointment and instructions to follow during this period.
4. Support start from top administration to healthcare staff.	4.1 Monthly meetings with the management team. Staff is required to submit their progress report every month.

Table 9: Change concept of clinical information system (cont.)

Clinical information system	Change concept
5. Ensure effective improvement strategies aimed at system change	5.1 Use the chronic care model, for improvement and learning.
6. Encourage discussion on mistakes and quality problems to improve care.	6.1 Review daily work as a routine to identify mistakes and suggest their solution.
7. Encourage patients to participate in effective community programs	7.1 Identify gaps in clinic services and see if they are provided in the community. 7.2 Link patients to community services that track outcomes. 7.3 Follow-up with patients receiving community services

Source: Summary of Chronic Care Model (79)

2.6 Patient satisfaction

Patient satisfaction is considered as the degree to which the individual patient perceives regarding the provision of healthcare services that are delivered as useful and according to the needs. To measure the quality of healthcare services patient satisfaction can be used as important indicator that indicates the quality of service at any level. (90) Quality of healthcare and patient satisfaction are widely used by the researchers as an outcome variable. In the context marketing research this approach should go beyond the patient satisfaction. (91) Patient satisfaction is not to be used as an alternative to improve the target symptoms and function rather it is an important variable to measure the overall outcome. The purposes to measure patient satisfaction are: to identify the various acceptable treatment regimens; to measure the patient's expectations for the treatment; to identify the provider's shortcomings of communication while dealing with them. (92) Measuring level of satisfaction is an

important factor towards improving the service provided and should be monitored regularly. (93)

Linder-Pelz (94) explained patient's satisfaction on theoretical basis. In order to increase the understandings about patient satisfaction, the author explained three theoretical bases. The first is discrepancy theory, explains perceived or relative discrepancy between the patient's desire and what they have been provided. The second is fulfillment theory; which is similar to discrepancy theory but it is not relative but the absolute difference between what is desired and received. The third is equity theory, explains "that satisfaction is perceived equity or perceived balance of inputs and outputs". (94) There are various reasons for the measurement of patient satisfaction that are based on the theories. On the basis of these theories the patient's satisfaction can be categorized into five hypothetical perception and attitude factors. Perceptions are expectations, entitlement, occurrence, and interpersonal comparisons while attitude is the core value. (95)

There are various important reasons to measure the patient satisfaction. Firstly; measure of social acceptance in relation to health outcome. Secondly; measure of public opinion for the available healthcare services. Thirdly; to measure the extent the healthcare services meets the needs and desires of the patients. There is another aspect to measure the patient's satisfaction is; it is used as outcome variable of the available healthcare services; it is used to measure the communication patterns of clinicians with the patients; and to measure the choice between alternative in the organization and provision of service quality. (96) However several negative assumptions of patient's satisfaction are also described; once they will uncover certain areas of dissatisfaction, they will be spread widely; the answers will be uniform; and invalidity. (97)

Patient evaluations of the interpersonal features of hospital care are influenced by interventions that physicians or nurses identify as "higher" quality of care. For evaluating patients' perception on quality of hospital service system, Rubin (98) listed seven aspects as important components of patients' hospital experience : 1)

admission; 2) nursing care; 3) medical care; 4)) communication; 5) other staff, service and care; 6) living arrangements; 7) discharge procedure. However, patient evaluations of nursing care and medical care are independently related to patients' overall satisfaction, overall assessments of quality, and intentions to recommend and return to the same hospital. Practical issues may be the most important obstacles for users of patient ratings, particularly regarding whether potential users will be able to interpret results and accept them.

For the patients and their families suffering from chronic diseases, McCusker (99) developed and tested seven scales to measure the attitude with reference to their satisfaction with the care provider. These seven scales are: general satisfaction; availability of care or continuity of care; availability of physician; physician's competence; personal qualities of the physician; communication style with physician; and involvement of patient and family while taking the decisions. This scale is useful to measure the preference for home care and preference for physician decisions.

It is indicated in one study (100) that the most important aspect of patient satisfaction is related to the communication pattern between healthcare provider and the patients. Its importance lies in the understanding of provider's style of communication and the possible reaction of the patients. Thus in case the quality of communication is better and according to the patient's mental capacity, the level of patient satisfaction will be higher and vice versa. The inputs in this case "provider-patient encounter" includes any previous experience with medical care, the objectives of patient's visit, the age of patient, type of the medical problem, number of patient's concerns, and characteristics of the physician's setting. The outcomes of this communication process includes knowledge of the patient, consensus of the provider and patient on the problem, patient's satisfaction, compliance of the patient with the recommendations, and possible solution for that particular problem.

2.7 Adherence to TB treatment

Adherence to TB treatment is an important factor to measure the success of any TB control program and it is defined as the attitude of a patient to follow the advice of the physician and healthcare staff and complete full course of treatment. Increase in treatment adherence result in high success rates. Likewise poor adherence reflects as weak health system and therefore reduced effectiveness and quality of services for that particular health system. (11)

The effectiveness of a good health system can be measured by the extent the patients with chronic diseases remain adherent and persistence with the treatment. It is a serious condition if the chronically ill patients cannot be managed properly. Both the behavioral and system barriers influence on the treatment adherence. There are a few intervention studies that attempted to identify those barriers that are related to the patients and matched the affect of these interventions with the patients. Every model tested and produced the similar results so not a single can describe the phenomena. But making the drug regimen as simpler and with a multidimensional behavioral approach provided better results to some extent. Some studies used better methodology by minimizing the confounding factors and with larger sample sizes just to determine an effective intervention. It is recommended for further studies to identify; patient related barriers, other issues related to adherence, how to overcome those barriers, and provision of regular social support to the patients. (101) The study by Rocha et al. (102) confirms that adherence to anti-tuberculosis treatment is the strongest independent determinant for recovery of tuberculosis in HIV-positive patients. In different populations, DOT has partly solved the problem of anti-tuberculosis treatment adherence and the association of incentives, such as food, clothes, bus tickets, help to improve adherence. It is imperative for the policy makers and healthcare planners to design the health system by including the operational effectiveness of health system to meet the needs, types and accessibility of the services to all the population, and more important are modalities of service delivery and providers concerns for the delivery of services.

The patients with non-compliance behavior not only prolong their disease, but the development of complication especially relapses and drug resistance may endanger the life also. The non-adherent behavior is like wasting the healthcare resources and increasing the risk for the health of their own, their families and to the community as well. The results of one study in Russia (103) indicated that TB patients were not adhering with the treatment and there were frequent interruptions in the treatment. It was concluded that there is a need for necessary interventions in order to improve the treatment adherence. It was recommended that providing social support and incentive programs for all the TB patients are necessary to increase treatment adherence. These priorities must be for the full length of treatment and for all TB patients. Although the researchers and healthcare care providers working with the TB patients realized the importance of treatment adherence since a long time but the policy maker have yet make the decision to include treatment adherence as policy matter. (104) It is evident that the incidence of multi drug resistance TB (MDR-TB) is increasing in many countries due to failure of current health system to manage the TB control activities in an effective way.

Treatment adherence among TB patients is itself a challenge because of the complexity of many factors: length of complete treatment is relatively longer; many drug required to take at the same time; side effects of these drugs are common; and the effect of feeling well at the initial stages of treatment makes the patient to stop treatment before it is completed the required period of time. Moreover the effect of disease related stigma makes the patient to hide the illness and starting the effective treatment of TB. It is argued that putting simply on direct observation therapy which is a necessary element of DOTS strategy is not the ultimate solution of the problem. Rather the effectiveness of direct observation treatment is still questioned. It was suggested in this context that directly observation of treatment is rather unnecessary and disrespect to the TB patients. Self-administered treatment and treatment observation by a family member have been proposed as acceptable alternatives. In the same article it is challenged that strong leadership and commitment of healthcare staff for a longer period of time is no more valid. It is controversial that the sole

responsibility of non-compliance lies on the public healthcare system and the community and not to the individual TB patient. (105)

It is suggested on the findings of another study that in case of practicing the directly observation of treatment, make it sure that it should be flexible enough according to the patient's convenience, whether it is carried out in a health facility, patient's home or at a place suitable for health worker. It is emphasized that instead of directly observation of treatment and making sure that patient is ingesting the pills, social support and education of the patients are rather more important. (106) Mishra et al. (107) recommends that in order to improve treatment adherence in TB treatment better communication between the physician and patient and staff and patients is much important.

A study in Nepal revealed that non-compliance to the treatment is reflected as system failure and it needs to be strengthening for efficient delivery of TB control services. For this purpose health care workers must be trained, provision of health education to the TB patients and their families, flexibility in directly observation of treatment, and provision of TB control services near the approach of the patients. (108)

2.8 Review of relative research findings

Quality of hospital service system

Weiner et al. (109) indicated in the study that was "aimed to examine the association between the scope of quality improvement implementation in the hospitals and hospital performance on selected indicators of clinical quality" participation of senior managers in the process of quality process is associated with good results. The selection of appropriate indictors for quality improvement is also important but the direction of association varies across various measures of quality improvement.

Ham (110) studied the role of clinical leadership for the improvement of performance and quality of healthcare services. It was concluded that there are valid reasons to improve the performance and quality of healthcare services. He compared

the usual practice to improve the performance in the hospitals by changing the professional clinicians, strengthening the hospital leadership, increased input of resources, information, and skill for introducing the change with the capacity building of people and organization. It was further concluded that the second option is rather slow in progression but it has a big impact for improvement in the performance in the future.

Rothman et al. (111) observed the role of primary care in the management of chronic diseases. As the incidence of the chronic diseases are increasing due to the demographic changes, most the chronically ill patients consult general practitioners in primary healthcare settings for the medical care. Due to substandard level of care provided to the patients at the initial stages for many chronic conditions, it is suggested that medical care for these patients may be shifted at specialist level. Primary care is good to provide the treatment but the system support and complete management are also important that cannot be available at primary health care levels.

Bodenheimer et al. (23) applied the chronic care model for the improvement of healthcare of patients suffering from chronic diseases. It was the second part of their study which indicated that chronic care model is an effective approach for the management of chronic diseases like diabetes. Moreover this approach was found as cost effective also.

Weir et al. (112) carried out the study to monitor the quality of hospital based stroke services. The researcher used the routine data of case fatality and the process of care for the patients of stroke in five hospitals. It was found that there are major shortcomings in the use of CT scanning, and the documentation was also incomplete. Before study the crude fatality rate was about 21 deaths per 100 admissions. After adjustment it was differed significantly with 5 to 7 more deaths per 100 admissions at hospital A compared to hospitals B through E.

Patient satisfaction

Wilson et al. (113) identified the key elements of patient satisfaction with intermediate care and measured using a questionnaire. The questionnaire was developed in three phases. The first phase was concerned to get information from the literature, hospital staff and patients. In the second phase validity and reliability of the questionnaire was tested in the patients who were recently discharged from the hospital. In phase three the final version of questionnaire was tested at five places. It was concluded that this questionnaire could be used as a tool for research in intermediate care.

Hendriks et al. (114); the author used personality as a determinant of patient satisfaction with the quality of hospital services. The aim of the study was to measure the extent the personality is related to the satisfaction of patient with the available hospital services for care. They concluded that personality has only a marginal effect on the satisfaction of patients so it cannot be used as an indicator to measure the patient satisfaction with the hospital services for the care.

Ofili et al. (115) carried out patient's assessment of efficiency of services at the University of Benin Teaching Hospital**,** Benin City, Edo State, Nigeria. It was concluded that there was a need for improvement in waiting time of patients before they were examined by the doctor, sanitation of the hospital and pharmacy department. On the other hand the patients were significantly satisfied with the work of laboratories, x - ray and catering departments.

Hering-ching et al. (116) compared the perceptions of the patients as individual and groups and examined the association patient's perceptions with 'potential patient loyalty' (PPL). It was concluded that the perception care of was good when provided in groups compared with the care provided as single patients.

Shipley et al.(117): this study aimed to assess the satisfaction of psychiatric patients, physicians, and referrers and compared it with the standardized

indicator used to measure the quality of healthcare services. It was concluded that quality of care can be better measured by using simple rating of the patient satisfaction as an indicator of quality measurement.

Treatment adherence

Liefooghe et al. (118) carried out in Sialkot, Pakistan in order to observe the affect of counseling on the patient's compliance with the treatment. The main purpose was to determine whether intensive counseling can improve treatment adherence. He concluded that intensive counseling has a significant, although limited, impact on treatment adherence.

Lin et al. (119) aimed to compare the quality of services in a group versus individual patient. Perceptions of the patient about the quality of service were recorded in a cross sectional study. The researcher used questionnaire of SERVQUAL. All the dimensions of quality of service were compared in group of patients with the individual patient practice. It was concluded that the quality of services was better when provided in the form of group rather individual practice. Moreover it was concluded that perception of the patients to measure the quality of service are a good indicator.

Jaiswal et al. (120) studied in the urban areas of New Delhi, India to observe the patterns of treatment adherence among TB patients. The researcher found that the basic reason for non-compliance with TB treatment is the gap between the priorities of the TB control program that do not match with the patient's needs and non consideration of particular characteristics of the disease and the treatment. The patients usually need flexibility in the service hours according to their requirements while healthcare system cannot adjust it properly. Moreover the arrangements for attending the families of TB patients and emergency management of TB patients are provided in the healthcare system. Some other problems that the patients usually face are long distance to approach the hospital, non-availability of doctors, and different levels of care between various ethnic and racial groups. The physicians have the

problems like poor interpersonal communication and no information about the strategy for those patients who re-enter the treatment after defaults.

McDonald et al. (121) aimed to observe the various interventions made in order to improve the treatment adherence among TB patients. The context of this study was the low levels of treatment adherence are not acceptable because it wastes all the benefits of the effective chemotherapy and treatment. It was concluded that the present strategies for the improvement of treatment adherence among the patients suffering from chronic diseases are very difficult to follow by the patients who have low education and understanding. In this way the effectiveness of these methods is lost. It was recommended that for the improvement of treatment adherence more studies may be carried out that aim to identify new approaches and innovative methods as needed for this purpose.

Mishra et al.(122): It was a case control study carried out in Nepal aimed to explore the effect of socio economic conditions on the compliance with the treatment among TB patients. The results of this study were in the favor that TB patients usually face financial problems due low income and family burdens which affect their ability to continue the treatment. Efforts to improve the accessibility by reducing the traveling cost can improve treatment compliance among TB patients.

Munro et al. (123) conducted a qualitative research in order to review the treatment adherence among TB patients. This research was carried out in context of poor compliance with the treatment by TB patients. In spite of various interventions and study findings it was observed that there was no significant improvement in treatment adherence of TB patients. The results of this study indicated that adherence to treatment is a complex phenomenon due to the influence of many factors. Unless the understanding of the barriers that prevent TB patients for compliance is not made, the problem will not be solved. It was recommended that a patient centered approach and addressing the barriers are required to improve the situation.

Khan et al. (124) carried out their study in rural areas of Pakistan, the author contended to explore the three dimensional factors like individual TB patient, the process of provision of health care services, and socio-cultural aspects of the TB patients that influence on the treatment adherence. The researcher also studied the impact of disease of the personal and family lives of the TB patients. It was concluded that treatment adherence among TB patients can be improved by providing them good quality anti-TB drugs, education and counseling in order to improve their trust on the treatment and increasing their knowledge and practices towards tuberculosis. It was also found that incorrect diagnosis and prescribing incorrect treatment regimen is another weakness of the healthcare providers. Updating the knowledge of providers can limit the prescription errors and thus reducing the emergence of multi-drug resistant tuberculosis.

This study aimed to develop and implement an intervention for the improvement of hospital service system. The variables used to measure the improvement before and after intervention were: quality of hospital service system, patient satisfaction and treatment adherence among TB patients. The improvement design was based upon the concept of chronic care model, with its six components i.e healthcare organization, delivery system design and team-based care, self-management support, connecting to community, support for evidence-based practice and information systems.

CHAPTER III

MATERIALS AND METHODS

This chapter describes the materials and methods that were used in this study. These include study design, study site, study population and sample size, research instruments, content validity and reliability, data collection, data analysis and ethical consideration. The purpose of the study was to improve the hospital service system in order to increase treatment adherence among TB patients.

3.1 Study design

It was a quasi experimental study, one group pretest-posttest design that aimed to evaluate interventions but that do not use randomization. Similar to randomized trials, quasi-experiments aim to demonstrate causality between an intervention and an outcome. Although the randomized controlled trial is generally considered to have the highest level of credibility with regard to assessing causality, but in this study non- randomized intervention was used due to ethical considerations.

3.2 Study site

This study was carried out at Rawalpindi District Hospital, Rawalpindi. It is a tertiary care hospital situated in the heart of Rawalpindi city. This area is densely populated and mostly middle and lower class resides in the catchment area of this hospital. It is about 500 beds hospital and affiliated with Rawalpindi Medical College. It has a separate TB chest clinic (OPD) and indoor facilities for the TB patients. In the TB clinic an average of 90 to 100 TB patients of all categories i.e new, follow-up cases, default cases, pulmonary and extra-pulmonary were registered each month.

3.3 Study population and sample size

All new TB patients who were registered at Rawalpindi District Hospital during February and March 2009 were included in this research. 99 TB patients who fulfilled the inclusion and exclusion criteria participated in this research.

3.3.1 Inclusion criteria

1. All new pulmonary TB patients either sputum smear positive or negative but diagnosed as TB patient during February and March 2009 were included.
2. Those patients were attending TB clinic on their second visit.
3. Only those patients aged ≥ 15 years.

3.3.2 Exclusion criteria

1. Extra pulmonary TB patients.
2. TB patients admitted in TB ward.
3. TB patients who refused to participate in this project.

3.3.3 Sample size calculation

The estimated sample size is calculated from the following formula.

$$n = \frac{\left[z_{\alpha/2}\sqrt{p_0(1-p_0)} + z_{\beta}\sqrt{p_1(1-p_1)}\right]^2}{\left[p_0 - p_1\right]^2}$$

n = Estimated sample size.

$Z_{\alpha/2}$ = The value from normal distribution associated with 95% confidence level = 1.96.

Z_{β} = The value from normal distribution associated with 90% confidence level = 1.282 (90% power)

P_0 = Estimated proportion of treatment adherence of TB patients before intervention = 59% (125)

P_1 = Estimated proportion of TB patients adherence to treatment after intervention = 75% (125)

Then calculated sample size where $Z_{\alpha/2} = 1.96$, $Z_{\beta} = 1.282$, $P_{0} = 0.59$, $P_{1} = 0.75$

= 91

3.4 Research instruments:

Self-administered questionnaire was used to collect data on quality of hospital service system. The questionnaire comprised of three parts: quality of the hospital service system; patient satisfaction and treatment adherence. For the measurement of quality of hospital service system we used five dimensions. Under these five dimensions contained twenty-four statements; i.e. accessibility (7 items), continuity of care (6 items), counseling (5 items), drugs and side effects (2 items) and logistics and supplies (4 items). Under these six dimensions contained thirty-five statements. The points given by patients were based on Likert scale from yes always = 2, yes sometimes = 1, and no, never = 0.

For patient satisfaction; SERVQUAL was used to measure the patient's satisfaction on the quality of hospital service system. It aimed to measure satisfaction and guidelines across the five service quality dimensions identified by Parasuraman et al. (62) These dimensions were: 1) tangibles- The appearance of physical facilities, equipment, personnel and communication materials; 2) reliability -ability to perform the promised service dependably and accurately; 3) responsiveness - willingness to help customers and provide prompt service; 4) assurance-knowledge and courtesy of employees and their ability to inspire trust and confidence; and 5) empathy - caring, the individualized attention the firm provides its customers. Under these five dimensions contained twenty items: tangible (6 items), reliability (5 items), responsiveness (4 items), assurance (3 items) and empathy (2 items). The points given by patients were based on Likert scale ranged from 1 to 5. 5 = very satisfied; 4 = satisfied; 3 = uncertain; 2 = dissatisfied and 1 = very dissatisfied.

Treatment adherence of TB patients was measured by using a structured questionnaire on self care practices of TB patients. The points given by patients were based on Likert scale from regularly = 3, often = 2, sometimes = 1, and never = 0.

3.4.1 Scoring criteria

Table 10 shows possible scores and cut off points of all the study variables. Quality of hospital service system contained possible scores ranged from 0 to 48 and it was categorized into three levels i.e., need for improvement, moderate, and good with cut-off points: less than 65% were need for improvement, 65% to 74% as moderate, and from 75% to 100% were ranked as good. The score distribution of less than or equal to 30 was at need for improvement, from 31 to 35 as moderate, and from 36 to 48 as good. Patient satisfaction had possible scores from 20 to 100 and was categorized also three levels; less than 70% were need for improvement, 70% to 79% were moderate and 80% to 100% were good. Scores less than or equal to 69 were need for improvement, from 70 to 79 were moderate, and from 80 to 100 were good. Treatment adherence had possible scores from 10 to 40 and has the similar three levels but different cut points i.e., less than 60% were need for improvement, 60% to 69% were moderate and 70% to 100% were good. Scores less than or equal to 18 were need for improvement, from 19 to 21 were moderate while scores from 22 to 30 were good.

Table 10: Possible scores and cut off points of all the study variables

Variables	Possible scores	Need for improvement	Moderate	Good
Quality of hospital service system (24 items)	0 – 48	≤ 30	31 – 35	36 - 48
Patient satisfaction (20 items)	20 – 100	≤ 69	70 - 79	80 - 100
Treatment adherence (10 items)	0 - 30	≤ 18	19 - 21	22 - 30

3.4.2 Content Validity and Reliability

The content validity was obtained by the committee of three experts. The reliability of questionnaire was obtained through pre-test with 30 TB patients who attended TB clinic OPD at Holy Family Hospital Rawalpindi. Pre-testing reliability had been accomplished in a group of respondents (30 subjects) who were socio-demographically and culturally similar to the study population. Cronbach's alpha coefficient was used to calculate the reliability of the questionnaire. The reliability for quality of hospital service system, patient satisfaction and treatment adherence was 0.78, 0.79, and 0.73 respectively.

3.4.3 Data collection:

When a patient was diagnosed as TB patient, he/she was invited to participate in the study. The researcher has explained the objectives of this study, procedure of the study and benefits of the study to each TB patient. Informed consent to participate in the study was obtained before collecting the data. All TB patients who met the inclusion criteria were recruited in this study. Three research assistants were trained on how to collect data from patients prior to helping in collecting data using questionnaires. Pre-test data on quality of hospital service system, patient satisfaction and self care was collected by using self-administered questionnaire during February and March 2009. Post-test data was collected at the end of September 2009 after six months of the implementation of improved hospital service system.

3.4.4 Data analysis

Descriptive statistics

Descriptive statistics such as percentage, mean, median and standard deviation (SD) were used to describe the general characteristics of TB patients who participated in the study.

Inferential statistics:

The outcomes of this study were quality of hospital service system, patient satisfaction and treatment adherence before and after the implementation of improved hospital service system. Paired t-test was used to compare the means of the variables before and after the implementation of improved hospital service system.

3.5 Study process

Training workshops were conducted to make sure that the healthcare team has gained a better understanding on all the elements of chronic care model and how these were used in the context of TB DOTS program. These trainings were intended for the healthcare team who was responsible to manage the TB patients in OPD and ensure treatment adherence until the completion of entire course of medical therapy. The approaches and procedures used were divided into three phases; phase 1, preparation; phase 2, implementation and phase 3 monitoring and re-enforcement.

3.5.1 Phase 1: Preparation (4 weeks)

The researcher divided this phase into three steps;

Step 1: Analysis of the existing service system in OPD of TB clinic:

The researcher analyzed the situation of existing service system in order to identify the gaps so that they can be improved during the process of improving the hospital service system. The main areas of concern were: getting the information about the various steps involved when patient enters into the hospital until he gets final treatment; whole process of diagnosing and managing a patient in TB clinic; laboratory procedure for sputum and other tests for a patients coming from TB clinic; process of getting TB drugs from the pharmacy; and the information regarding the facilities at waiting place and discipline to see the doctor. Table 11 shows the different categories of staff involved for the management of TB patients and their strength. This staff was permanently deputed in the TB clinic. From the hospital management side additional medical superintendent was the member of team who was organized for the improvement of hospital service system. For training program

additional members were also invited in an anticipation that in case any staff cannot come on the duties the routine should not suffer.

Table 11: Staff category of healthcare team

Staff category	Number	Staff attended training
Additional MS	One	One
Deputy MS	Two	Two
Male medical officer	One	Two
Woman medical officer	One	One
Nurse	One	Two
DOTS facilitator	One	Three
Community health worker	One	Two
Clerk	One	One
Laboratory technician	Two	Two
Assistant pharmacist	Two	Two

Patient's comments and suggestions on the quality of service and their level of satisfaction towards the healthcare team and treatment provided to them were also recorded. The information on the knowledge and behavior of healthcare staff; their level of communication with the patients and the system of follow-up of TB patients were also recorded. Moreover the information on the problems of healthcare staff working in TB clinic was also recorded.

Step 2: Re-orientation of hospital staff:

Engagement and involvement of hospital administration:

The researcher had multiple meetings with the Director / Medical Superintendent of District Hospital, Rawalpindi along with other officers involved in hospital management process and given a briefing on the objectives, process and usefulness of this study and getting a better understanding between the researcher and hospital administration and to familiarize the team with the improvement strategies. Hospital administration is involved in this study in order to allocate resources, remove obstacles, and to support the changes recommended in improved hospital service

system. The hospital administration allowed the researcher to carry out this study with the commitment that his cooperation will be available all the time.

Provider and healthcare team building:

A multi disciplinary team which included physician, nurse/dispenser, DOTS facilitator, community health worker, laboratory technician, pharmacist, and a junior clerk/record keeper was created in consultation with the Director / Medical Superintendent of District Hospital. In order to ensure proper working and immediate problem solving, Additional Director/Additional Medical Superintendent was assigned the duties of chairperson of this team.

Capacity building of healthcare team:

In order to provide sufficient information and knowledge on the improvement of hospital service system, a comprehensive training program was started which was divided into three parts; 1. TB DOTS program; 2. The concept of chronic care model; and 3. Improvement of treatment adherence among TB patients.

TB DOTS program:

The purpose to provide the training on TB DOTS program was to provide the updated knowledge to the healthcare team on the technical aspects related to diagnosis and treatment of TB patients. It was divide into eight parts; 1. Identifying of a suspect: 2. Diagnosing a TB patient; 3. Treatment of TB; 4. Educating TB patients and managing contacts; 5. Managing directly observed treatment; 6. Managing TB with interrupted treatment; 7. Declaring treatment outcomes and quality of care; and 8. Managing support and program inputs. The basic concept was related to decision support element of the chronic care model. Moreover this training enabled the healthcare team to be linked with the nationwide method for the treatment of TB patients.

The concept of chronic care model

The Chronic Care Model (CCM) identifies the essential elements of a health care system that encourage high-quality chronic disease care. These elements

are the community, the health system, self-management support, delivery system design, decision support and clinical information systems. The training enabled the healthcare team to understand how the various elements of chronic care model are inter-related for the improvement of hospital service system and ultimately increasing treatment adherence among TB patients.

Improving treatment adherence

In this training workshop the researcher discussed the various dimensions that have positive and negative effect on the treatment adherence of TB patients. There were five dimensions that were discussed during this workshop.

Health system related factors: for example Uninterrupted supply of drugs, reducing waiting times; positive behavior of doctor and staff, follow up, default tracing, and provision of information related to disease, side effects of drugs and preventive care.

Socio-economic related factors: for example free of cost supply medicines and laboratory diagnosis, effective social support, education to the patients and easy access for treatment.

Condition related factors: for example education on the use of anti-TB drugs. Therapy related factors: for example providing fixed dose combination of drugs. Patient related factors: for example timely reminders, and reducing disease related stigma.

3.5.2 Phase 2: Implementation (6 months)

Chronic care model depicts the healthcare team as sole responsible to provide treatment to TB patients with the concept that patients have a central role in the management of their disease. As the team constituted was included a responsible person from hospital management (in this study additional medical superintendent) 2 doctors deployed permanently in TB OPD with their willingness, nurse ambitious to work in TB OPD, DOTS facilitator and clerk etc. Healthcare organization support improvements at all levels required for the smooth running of the project and ensures the changes recommended for the improvement were made well in time. These improvement strategies will be aimed to bring about change in the hospital service system.

Implementation phase started from 1st April to 30th September 2009. Before the implementation of the improved hospital service system, the researcher ensures that all the logistics and supplies necessary like anti-TB drugs, laboratory reagents, printed material etc. during implementation were in place.

Duties of staff in TB clinic

1) Hospital management: The main responsibility for the hospital management was supervision and monitoring of work in TB clinic and ensured smooth working by maintenance of discipline. Regular supply of anti-TB drugs and other logistics was another responsibility.

2) Clerk: Routine registration of every patient visiting at TB clinic with history of cough more than three weak. He will record general information about the patients like name, father/husband name, age and address. He issues an examination slip along with OPD number. He also issues token number so that patients can be checked on their turn. He was responsible to maintain discipline in the TB clinic.

3) Nurse: She recorded the history, sign and symptoms like cough, fever, weight loss, appetite, and record body temperature, pulse and blood pressure on the examination slip. She issued a request slip for sputum examination and other laboratory tests and referred the patient to laboratory. In addition to this she planned community visits with the collaboration of community health worker.

4) DOTS facilitator: He was responsible to provide health education to TB patients. Entry of news cases in district TB case register and referred the doctor. He accompanies the health team that visits the community fortnightly. He was responsible for the follow up the patients. He informed doctor if any patient missed his appointment. He has to contact with the patient directly or through community health worker. He has to provide proper guidance for the selection of treatment supporter.

5) Doctor: Physical examination of every TB case and confirmation of the diagnosis. He discuss with the patient about the social aspects in order to evaluate the level of adherence of the TB patients. He was responsible for the entire

satisfaction of the patients. He is responsible for the overall management of disciple in the TB clinic.

6) Laboratory technician: He has to send the complete reports of TB patients directly to TB clinic according to the set time schedule. He would provide the sputum cup for the collection of sputum and advocate the proper method for the collection and disposal of sputum to the TB patients.

7) Community health worker: She has to plan community visits in collaboration with nurse and provide help to TB patients for identification of suitable treatment supporter.

8) Assistant pharmacist: He has to provide anti-TB drugs for one month period in packets and facilitate TB patients on the method of drugs intake. He will keep the stock updated and inform doctor in TB clinic.

Figure 6 shows diagrammatic presentation of TB clinic OPD services after improving the hospital service system. It was recommended that in order to minimize the long waiting time and create discipline in OPD services should follow the routine set in the diagram. All new patients on the first day (day 1) were registered as soon as they report to the OPD. After registration they were referred to the nurse working in the TB clinic. Nurse recorded the brief history and vital signs like pulse, patient's weight, blood pressure, body temperature and general condition of the patient and if he/she was a TB suspect (according to the patient's history and signs and symptoms) was referred to laboratory for sputum examination (and other tests if required). Laboratory technician collected the first specimen (spot 1) of sputum. Laboratory technician is responsible to provide technical guidance to the patients for the collection of good quality sputum. Laboratory technician has to provide every TB patient a sputum cup for second specimen (morning specimen) of sputum. Third specimen (spot 2) was collected in the laboratory. The time schedule for sputum collection was first specimen any time during the working hours. For second and third specimen patients were advised to report next day but no later than 10.30 AM. Laboratory technician was bound to complete the test reports of all the patients until 11.30 AM and will send to the TB clinic OPD directly. Patients during this time were

attended by the DOTS facilitator to get information on treatment supporter and provided necessary education and knowledge about TB, and course of treatment.

After reports from laboratory were received, he referred the smear positive cases to the doctor immediately. For smear negative cases, DOTS facilitator has referred the patients for x-rays. The patients after having their x-rays done will report to the doctor in the TB clinic for final diagnosis. After diagnosis was confirmed TB patients were entered in TB 01 register. Doctor has guided the patient how to get the anti-TB drugs from the pharmacy. The pharmacist, who had already prepared packets of one month anti-TB drugs, handed over to the TB patients.

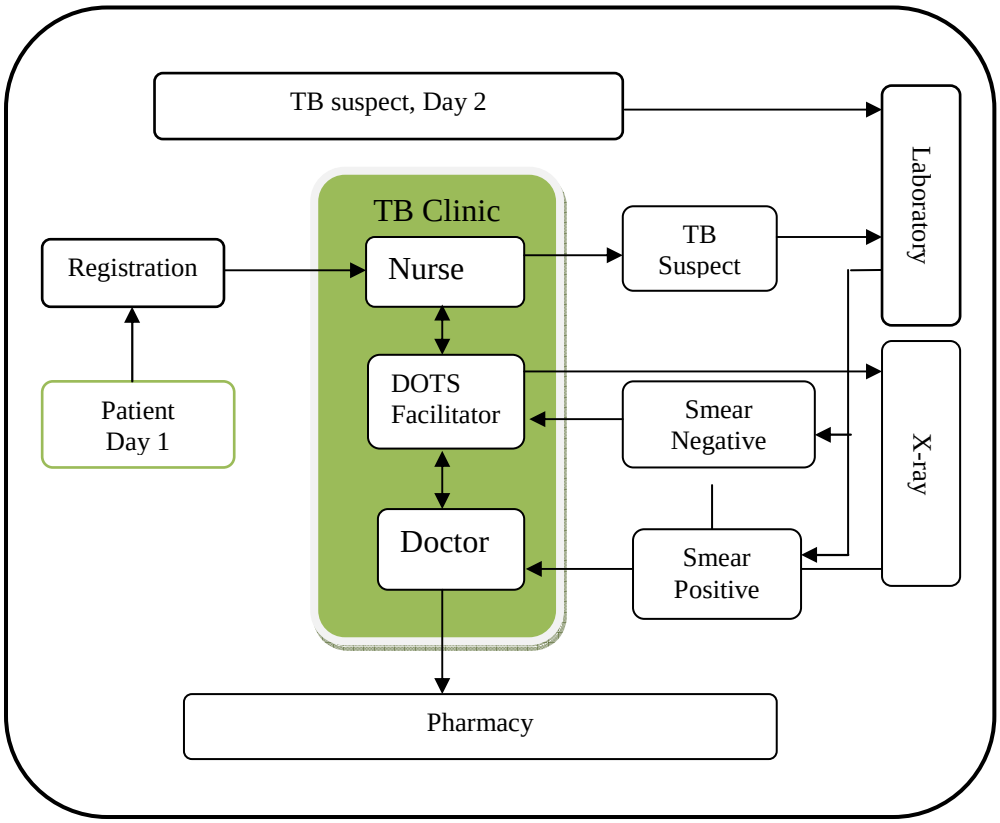

Figure 6: TB Clinic Outpatient Department after improvement of hospital service system

Step 3: Logistics and supplies:

Setting proper and effective linkages between healthcare team, pharmacist and laboratory to ensure that there will not be any delay in laboratory tests and providing anti-TB drugs to the patients. After ensuring that all the arrangements like trainings, networking and specific logistic supplies are in place before starting second phase.

3.5.3 Phase 3: Monitoring and re-enforcement (2 weeks)

The purpose for this phase was to review on the study's objectives. Workshops were arranged with the healthcare team, and hospital management. Lesson learned from this process can be feed backs and suggestions for improvement: 1) Overcome barriers to improvement; 2) Apply process mapping methodology to new processes to ensure efficiency and sustainability; 3) Continue to optimize clinical interactions; 4) Work with community resources to ensure access to services that may not be available in house.

3.6 Ethical considerations

Approval was taken from the Ethics Review Committee, Faculty of Public Health Mahidol University (Appendix B). Permission to carry out the study was obtained from the Chief Executive Officer, Principle Rawalpindi Medical College and allied hospitals (Appendix C).

Informed consent was taken from all the respondents who participated in this research. Prior to any interview, a written informed consent was obtained from each respondent. The aim, objectives, and methods of data collections were explained briefly to the respondents. The subjects were ensured to their rights to refuse and recline from the study at any time during the course of this study. Using code numbers the confidentiality and anonymity.

CHAPTER IV
RESULTS

The purpose of this study was to improve the hospital service system in order to increase treatment adherence among TB patients at OPD District Hospital Rawalpindi. For this purpose researcher applied the concept of chronic care model at various aspects of service delivery and management of TB patients. The results of this study are as follows:

4.1 General characteristics of TB patients

Table 12 shows the general characteristics of new pulmonary TB patients attended the TB clinic District Hospital Rawalpindi. It appeared that from all ninety nine patients less than half (47.5%) were between the ages 15 to 24 years. The minimum and maximum ages were 15 and 80 years respectively. The mean and standard deviation of age was 31.6 ± 15.4 years. More than half (57.6%) of the patients were female and most of them (80.8%) were Muslims. For marital status of the patients nearly half (49.5%) of them were married while more than one-third (41.4%) were single. More than half of the patients (55.6%) had the highest education in secondary school while less than half (40.4%) had their education in primary school. About half (49.5%) of them were laborer and more than two-third (38.4%) were un-employed. Less than half (44.4%) of the patients had income from 5001 to 10000 rupees per month while more than one-third (35.4%) had no income. The minimum and maximum income was 0 and 12,000 rupees respectively with the median income of 6000 rupees per month.

Table 12: General characteristics of 99 TB patients

General Characteristics		Number	Percentage
Age (years)			
	15 – 24	47	47.5
	25 – 34	18	18.2
	35 – 44	14	14.1
	45 – 54	9	9.1
	≥ 55	11	11.1
	Mean = 31.59 ± SD = 15.36	Range 15 – 80	
Gender			
	Male	42	42.4
	Female	57	57.6
Religion			
	Muslim	80	80.8
	Christian	19	19.2
Marital status			
	Married	49	49.5
	Single	41	41.4
	Widow	9	9.1
Education			
	No education	3	3.0
	Primary school	40	40.4
	Secondary school	55	55.6
	University	1	1.0
Occupation			
	Unemployed	38	38.4
	Laborer	49	49.5
	Govt. Employee	11	11.0
	Farmer	1	1.0

Table 12: General characteristics of 99 TB patients (Continued)

General Characteristics	Number	Percentage
Monthly income (Rupees)		
No income	35	35.4
< 5,000	12	12.1
5,001 – 10,000	44	44.4
> 10,000	8	8.1
Median = 6,000	Range 0 – 12,000	

4.2 Hospital service system

Rawalpindi District Hospital is a tertiary care hospital attached with Rawalpindi Medical College where senior most physicians and surgeons in all departments were available on their service. Most modern diagnostic equipment was also available along with more budget is provided to this hospital as compared to the other district level hospitals. So the expectations of the patients on the quality of services are higher than the patients visiting the district hospitals in other districts. Majority of the population in the catchment area of Rawalpindi District Hospital was lower and middle class.

TB clinic was established in this hospital since a long time with a separate ward of TB and chest diseases for indoor patients. As observed during this study that before the implementation of improved hospital service system, there were no standing operating procedures for TB clinic. No information was provided to the TB patients with direction boards or literature. There was neither any incentive for the staff working in TB clinic nor for the TB patients. Follow up procedure for TB patients were very poor. No schedule for community visits. Doctor's and staff behavior was also needed to be improved. Discipline and comfort in waiting room was not up to the mark. It was the perception of the researcher that doctor and staff

were either not well trained on TB DOTS program or they were not motivated enough as there was lack of interest in their working. Hospital administration did not care for patient's complaints, improving quality of services and motivating the healthcare staff to improve their performance. No system for the evaluation and monitoring of the services and solving genuine problems of the healthcare staff.

The study was divided into three phases; phase 1) Preparation; phase 2) Implementation to improve hospital service system; and phase 3) Evaluation and enforcement.

4.2.1 Phase 1: Preparation (4 weeks)

A. Analysis of the existing system

During the analysis of existing system, it was found from a short interview with the patients attending TB clinic that they were registered since 8.30 AM and waiting to see the doctor for nearly four hours and still they were uncertain when they get treatment. They showed their un-satisfaction on the waiting area (as it was not a proper room). The patients also provided the information that the reason to visit this hospital was being a tertiary care level hospital with experienced doctor and staff. A few patients who were visiting the TB clinic since last two visits were not satisfied with behavior of doctor and information provided to them with respect to TB and its treatment. Moreover they did not show the confidence on the doctor's expertise and appointments schedule given to them.

On the other hand healthcare staff and doctor provided the information during a dialogue that they themselves were facing with a lot of problems. They were overburdened due to additional responsibilities, no rewards for the good work from the hospital administration and frequent transfers from one department to another department were the common problems. In this environment it was not justifiable for the staff to work with interest and dedication.

In conclusion this was based on the information obtained from patients in terms of no proper waiting room, long waiting times, and rude behavior of staff.

Patients need sufficient time to discuss their problems about accessibility with the doctor and staff. They need more information about the disease and self care. Moreover laboratory tests were not prepared in time and they have the come again and again for the results. Doctor and staff were facing difficulties in their work in terms uncertainty to work in TB clinic and can be transferred to another department at any time, changing among the staff means once every member staff gets familiar with their work and patient's demands and start working as a unit some of the members are transferred and the work is disturbed. Most of the time the doctor and staff had additional night duties which create lack of interest in their work in TB clinic. No system for encouraging the staff or any rewards for the good work. There were limitations of the hospital administration as they cannot increase budget and human resources during this study.

B. Collaboration with the hospital administration

The role of healthcare organization remains at the center in order to improve the hospital service system. Support from the hospital administration solved most of the problems like a separate waiting room for the TB patients, implemented the changes that were recommended during re-designing of hospital service system for improvement e.g like networking between TB clinic-laboratory and TB clinic-pharmacy. Healthcare staff was assured that they will not be changed without a definite reason, reward for the good work, and no additional responsibilities other than duties in TB clinic. Hospital administration allowed a fortnight visit of community by the staff of TB clinic and provided hospital transport for this purpose.

The limitations of the hospital administration like additional finances and human resources were compromised and study project was carried out with the same budget and same number of the staff working in the TB clinic.

The hospital follows a system for the procurement of drugs and other supplies on annual basis. The pharmacist of the hospital provided this information that there were sufficient stock of anti-TB drugs and other supplies available in the

hospital that will be sufficient for entire period of the study project. Trainings of multidimensional staff on the concept of chronic care model and TB DOTS program was completed before implementation phase.

Table 13: Process and results categorized into the components of CCM

Process Application of CCM	Results
Healthcare Organization (Rawalpindi District Hospital)	1. Ownership and support for this study 2. Implementation of changes recommended for improvement. 3. Doctor and staff of TB clinic will not be changed. 4. Rewards of the good work for healthcare staff working in TB clinic. 5. Sufficient supply of anti-TB drugs and logistics.
Self-management support.	1. Healthcare staff working on the concept of central role of patient for the management of the disease. 2. Healthcare staff using "5A" to work with the patients. 3. Healthcare staff providing information about TB. For example course of treatment, side effects of drugs, preventive measures etc.
Delivery system design	1. Assigning duties to the staff: Now working as a single unit 2. Elimination of un-necessary steps for services: reduced waiting time 3. Allocation of separate waiting room: Patients feel secure 4. Discipline in TB clinic: every patient gets appointment on his turn. 5. Reports from laboratory were sent directly to TB clinic instead of handing over to patients that caused delay in treatment. 6. Scheduled follow up: Reduced default rate
Decision support	1. Healthcare staff using updated knowledge of TB DOTS program for treatment 2. Healthcare staff applying concept of CCM effectively. 3. Healthcare staff providing written instructions to the patients with clear date of next appointment 4. Staff providing necessary education on the health problems of TB patients.

Table 13: Process and results categorized into the components of CCM (cont.)

Process Application of CCM	Results
Community	1. Fortnight visit of healthcare staff to selected communities. 2. Linkage of services to community resources
Information system	1. Systematic follow up of TB patients 2. Timely reminders to patients. 3. Monthly meetings of healthcare staff with the hospital administration to solve the problems and bring further improvement.

4.2.2 Phase 2: Implementation (6 months)

The approach and procedure adopted to apply the concept of chronic care model was introduced through improving the capacity of healthcare team working in the TB OPD. The interventions are as follows:

In order to apply the concept of chronic care model, a training program was scheduled which was described in Chapter 3. These trainings were interrelated with all the elements of CCM and designed to meet the objectives of the study which was as follows;

1. Healthcare organization: The hospital administration understood the process and the changes for the improvement of hospital service system and would support improvement at all levels of the organization, beginning with the senior leader. These improvement strategies were aimed to bring about change in the hospital service system. Hospital service system was improved in terms of accessibility, waiting time, and provider's manners. Accessibility may be explained in terms of information system, time (waiting time, service time and time for travelling), and the provider's manners. Fortnight home visits were scheduled to build a regular contact of a healthcare person with the TB patient during the course of treatment in

order to ensure treatment adherence. Information system is concerned with interaction with community, home visits and reminders.

2. Self management support: The training on the CCM resulted in a change in the behavior of all the staff working in TB clinic. Now the healthcare team was more concerned on the patient's central role in the management of the TB. Healthcare team was providing useful information on TB disease, its treatment, and side effects of the anti-TB drugs. Doctor has adopted 5 A's (assess, advise, agree, assist, and arrange) technique to provide effective self-management support which includes goal setting, action planning and problem solving, and follow-up. This part also covered the counseling for TB patients. So the counseling was focused on the patient's central role in managing his or her health by using effective self-management support strategies. Effective counseling techniques and improved communication with the patient resulted in the improvement of their self-care practices, more knowledge about disease and side effects of drugs and compliance to the treatment was increased.

3. Delivery system design: The result of assigning the responsibilities and duties for every staff, it developed a discipline to provide services in the TB clinic. As the staff was trained on communication techniques with patients of different cultures, the relationship between the doctor-patient and staff was observed much better as compared to the previous. The staff informed that they did not have any knowledge on good counseling until this training. They did not talk freely with the patients on issues like stigma and personal matters of patients about the disease. The continuity of care was assured by this ability of staff to provide uninterrupted coordinated hospital service for TB patients that was much improved now. Regular follow-up of the TB patients was a part of delivery system, responsible to increase the treatment adherence.

4. Decision support: As a result of refreshing the knowledge recent information on chronic care model of the healthcare staff and doctor had full command on the tuberculosis treatment which was based on chemotherapy. Doctor

was prescribing drugs in appropriate combination, and in correct dosages. That was the effect of training on TB DOTS program that provided sufficient and updated knowledge to the physician to treat the TB patients in an effective manner. It resulted in the increased confidence and expertise of doctor to manage the patients. Similarly patients also developed trust on the doctor and staff that was necessary for the compliance with treatment adherence.

5. Clinical information system: Assigning duties to the staff there was well organized system of patient care planning. As a result timely reminders were given to providers and patients as a routine matter. There was coordination in care by sharing information with patients and providers. There was monthly review on the performance of staff and patient's interaction. The appointments were given according to the treatment schedule.

6. Community: Community involvement was an important element of chronic care model. Fortnightly community visits of community by the healthcare team encouraged the patients to participate in community programs. The visits raised the community awareness through networking and education. Community visits provided patients and their relatives to learn about TB and removing the societal stigma about the disease. As a result community was involved to provide social support to TB patients and overcome the societal barriers attached with the TB.

4.2.3 Phase 3: Evaluation and re-enforcement (2 weeks)

The results of this study were used to evaluate the process, difference among variables before and after improvement, and difficulties during this study. It was found that there was significant difference between the means of variables after improvement of hospital service system indicated that the quality of hospital service system was improved significantly, patient satisfaction was improved significantly, and there was improvement in the treatment adherence of TB patients. The main focus of the chronic care model is healthcare organization and the healthcare team for the improved results. After evaluating the results hospital administration was found more

confident because improvement occurred without using additional budget and human resources. This study provided an insight that regular trainings of the staff plays an important role for the improvement of quality of services which is reflected in increased patient satisfaction and adherence to the treatment.

4.3 Quality of hospital service system

Table 14 summarizes the levels of quality of hospital service system as perceived by the TB patients along with its dimensions. It was found that before improving the hospital service system there was 94.9% need for improvement in the quality of hospital service system. It was measured after six months implementation of improved hospital service system and the results were much better as there was 6.1% need for improvement.

Results in table 14, indicated that more than two-thirds of patients (75.8%) responded that accessibility to the hospital services needed improvement before improvement of hospital service system. After six months of improvement in hospital service system the results were better as compared to before because only one-fifth of respondents (19.4%) reported as needed improvement. Before the implementation of hospital service system nearly one-third of patients (31.3%) perceived that continuity of care needed improvement. Results after six months showed betterment as 13.3% reported as needed improvement. Almost all of the respondents (98.0%) indicated that counseling needed improvement before the improvement of hospital services. After improvement of service system results were better as compared to before. For drugs and side effects before implementation more than half respondents (67.7%) indicated that needed improvement. After implementation none of the respondents reported as needed improvement. For logistics and supplies there was improvement in the results after implementation of hospital service system (50.5% vs 18.4%).

Table 14: Percentage of quality of hospital service system before and after improvement of hospital service system.

Variable	Before (n = 99)	After (n = 98)
Overall quality of hospital service system		
Good	1.0	28.3
Moderate	4.1	64.6
Need for improvement	94.9	6.1
Accessibility		
Good	1.0	26.5
Moderate	23.2	54.1
Need for improvement	75.8	19.4
Continuity of care		
Good	39.4	53.1
Moderate	29.3	33.6
Need for improvement	31.3	13.3
Counseling		
Good	0.0	9.2
Moderate	2.0	41.8
Need for improvement	98.0	49.0
Drugs and side effects		
Good	32.3	78.6
Moderate	0.0	21.4
Need for improvement	67.7	0.0
Logistics and supplies		
Good	49.5	81.6
Moderate	0.0	0.0
Need for improvement	50.5	18.4

4.3.1 Quality of hospital service system by items before and after improvement of hospital service system

Table 15 shows comparison between percentage of respondents regarding their perceptions about hospital service system by items before and after the improvement of hospital service system.

Accessibility:

Regarding accessibility to the hospital services, it was found that before the improvement of hospital service system nearly half of the respondents (50.5%) perceived that in this hospital, services were never provided within a short period of time as compared to 4.1% after improving the hospital service system. To provide guidance by clear sign boards, more than one third of respondents (36.4%) perceived that the direction boards for the guidance were never displayed as compared to 5.0% after improving hospital service system. As far as attending the patients in a friendly manner is concerned, less than one fourth of respondents (23.2%) perceived that doctor never attended the patients in a friendly manner whereas after improving hospital service system only 6.1% patients perceived the same. Provision of information about the available services, there was betterment before and after improvement of hospital service system (16.2% vs 2.0%).

Continuity of care:

In the present study, it was found that nearly one-fifth of the patients reported that hospital staff never gave appointments according to the treatment schedule. After six months of implementation of improved hospital system there was also improvement as shown by the results (19.2% vs 0.0%). For same staff in TB clinic, 6.1% patients perceived that hospital staff was never being the same person as compared to 0.0% after improvement. Regarding the feelings of the respondents on treatment given was in progress, there was betterment before and after improving the service system (6.1% vs 0.0%). For provision of services at announced time, 5.1% patients perceived that services were never provided at announced time as compared to after 1.0% perceived the same.

Counseling:

More than half of the patients perceived that the doctor never spent time for the discussion of patient's fears and concerns before improvement of service system as compared after there much improvement as 64.6% vs 2.1%. More than half of the patients (52.5%) responded that hospital never provided information about TB, its treatment and side effects of drugs whereas after improving the service system only 2.1% perceived as the same. It was found that more than one third of patients responded that the hospital never gave individual attention (e.g. taking medical history, flexibility to accommodate patient's requirements, and disliking), before improvement in hospital service system as compared to the better after improving the service system as 36.4% vs 2.0%. Less than one third of patients (30.3%) perceived that hospital staff never gave advice to solve their problems. After improving the hospital service system, only 2.0% had this perception. For understanding specific needs of the patients, less than one third patients (29.3%) responded as never. After improvement only 3.1% had the same perception.

Drugs and side effects

The results in table 15 showed that more than half of the respondents (57.6%) responded that they have never provided the information on side effects of TB drugs as compared to after improvement of hospital service system only 4.1% patients responded as the same.

Logistics and supplies

About half of the patients (51.5%) responded that laboratory tests were never done without delay. After improvement in hospital service system this situation was improved as only 6.1% patients responded that laboratory tests were never done without delay.

Table 15: Percentage of TB patients on quality of hospital service before and after improvement of hospital service system by items

Item	Before (n = 99)			After (n = 98)		
	Yes always	Yes sometimes	No never	Yes always	Yes sometimes	No never
Hospital is easy to access in term of its services.	45.5	51.5	3.0	65.3	32.7	2.0
Hospital staff welcomes with a friendly manner.	19.2	68.7	12.1	35.7	60.2	4.1
Doctor attends in a friendly manner.	9.1	67.7	23.2	36.7	57.2	6.1
Service hours are convenient.	67.7	23.2	9.1	70.4	24.5	5.1
Hospital has clear direction boards to guide patients where to receive the service.	1.0	62.6	36.4	17.3	77.6	5.0
Hospital provides service within short period of time.	3.0	46.5	50.5	29.6	66.3	4.1
Hospital provides information on available services.	15.2	68.7	16.2	36.7	61.2	2.0
Hospital provides its services at the time it is announced	52.5	42.4	5.1	61.2	37.8	1.0
Doctor has patient profile in hand.	64.6	32.3	3.0	66.3	33.7	0.0
Doctor has never repeated asking the same questions.	33.3	62.6	4.0	15.3	45.9	38.8
Hospital staff always being the same person.	30.3	63.6	6.1	55.1	44.9	0.0

Table 15: Percentage of perceptions of TB patients on quality of hospital service before and after improvement of hospital service system by items (continued)

Item	Before (n = 99)			After (n = 98)		
	Yes always	Yes sometimes	No never	Yes always	Yes sometimes	No never
Hospital staff gives appointments according to the treatment schedule.	27.3	53.5	19.2	50.0	50.0	0.0
Feeling as treatment given is in progress	36.4	57.6	6.1	55.1	44.9	0.0
Hospital gives individual attention to the patients (e.g. taking medical history, flexibility on patient's requirements)	0.0	63.6	36.4	18.4	79.6	2.0
Hospital keeps patients informed about TB, its treatment and side effects of drugs.	0.0	47.5	52.5	41.8	56.1	2.1
Hospital staff understands the specific needs of patients.	1.0	69.7	29.3	25.5	71.4	3.1
Hospital staff gives advice to solve the problems.	7.1	62.6	30.3	34.7	63.3	2.0
Doctor spends time on discussing the fears and concerns about the disease.	6.1	29.3	64.6	36.7	61.2	2.1
Drugs given are good quality	71.7	28.3	0.0	71.4	28.6	0.0
Necessary information about the side effects of TB drugs is provided.	0.0	42.4	57.6	32.7	63.2	4.1

Table 15: Percentage of perceptions of TB patients on quality of hospital service before and after improvement of hospital service system (continued)

Item	Before (n = 99)			After (n = 98)		
	Yes always	Yes sometimes	No never	Yes always	Yes sometimes	No never
TB drugs available on each visit in the hospital	67.7	31.3	1.0	67.3	31.6	1.1
Laboratory is well equipped whenever a test is required.	58.6	38.4	3.0	63.3	33.7	3.1
The examination room is well equipped whenever physical examination is required	68.7	30.3	1.0	74.5	25.5	0.0
Laboratory tests are done without any delay	1.0	47.5	51.5	39.8	54.1	6.1

4.3.2 Comparison of quality of hospital service system before and after improvement.

Table 16 summarizes the mean scores of overall quality of the hospital service system and its dimensions. Paired t-test was used to compare the means. The mean scores for quality of hospital service system before improving was 25.1 ± 3.7 (mean ± standard deviation) whereas the score after improvement was 32.8 ± 2.4. Using student's two tailed paired t-test, the difference was statistically significant at $p < 0.001$. For all the five dimensions of quality of hospital service system, the mean scores for accessibility to hospital, continuity of care, counseling, drugs and side effects, and logistics and supplies were increased after the improvement of hospital service system. Using paired t-test, the difference was statistically significant at $p < 0.001$ for each dimension. Therefore it was concluded that the improved hospital service system was better than the previously working service system. So the

hypothesis that quality of hospital service system after implementation will be better than before was accepted.

Table 16: Comparison of quality of hospital service system before and after improvement of 98 TB patients

Variable	Before	After	p-value*
	Mean (SD)	Mean (SD)	
Overall quality of hospital service system	25.1 (3.7)	32.8 (2.4)	< 0.001
Accessibility	7.1 (1.7)	9.3 (1.3)	< 0.001
Continuity of care	8.0 (1.5)	8.6 (1.0)	< 0.001
Counseling	3.0 (1.2)	6.5 (0.9)	< 0.001
Drugs and side effects	2.1 (0.7)	3.0 (0.8)	< 0.001
Logistics and supplies	5.4 (1.2)	6.3 (1.1)	< 0.001

* p-value by paired t-test

4.4 Patient satisfaction

Table 17 summarizes the levels of patient satisfaction and its dimensions. The results showed that before improvement of hospital service system the 8.1% patients responded that there is need for improvement in the overall patient satisfaction whereas after improvement none of the patient responded that there was need for improvement.

For tangibles, it was found that nearly one third of the patients (32.3%) responded that there was need for improvement. The results were better after improving the service system as none of the patients responded that there was need for improvement. For reliability, more than one fourth of the patients responded as there was need for improvement whereas the situation was better after improving the service system (26.3% vs 3.1%). For responsiveness as the results indicated 13.1% patients responded that there was need for improvement but after improving service system it was better as none of the patient responded need for improvement.

Regarding assurance 17.2% patients perceived that there was need for improvement whereas after improving the service system fewer patients (7.1%) perceived need for improvement. For empathy the patient satisfaction was improved as 24.2% vs 1.0% before and after improvement of hospital service system respectively.

Table 17: Percentage of patient satisfaction and its dimensions before and after improvement of hospital service system

Variable	Before (n = 99)	After (n = 98)
Overall patient satisfaction		
Good	10.2	54.1
Moderate	81.7	45.9
Need for improvement	8.1	0.0
Tangibles		
Good	6.1	29.6
Moderate	61.6	70.4
Need for improvement	32.3	0.0
Reliability		
Good	15.2	54.1
Moderate	58.5	42.8
Need for improvement	26.3	3.1
Responsiveness		
Good	35.4	52.0
Moderate	51.5	48.0
Need for improvement	13.1	0.0
Assurance		
Good	42.4	65.3
Moderate	40.4	27.6
Need for improvement	17.2	7.1
Empathy		
Good	39.4	70.4
Moderate	36.4	28.6
Need for improvement	24.2	1.0

4.4.1 Percentage of patient satisfaction before and after improvement in hospital service system by items

Table 18 shows comparison between percentage of respondents regarding their perception about patient satisfaction before and after the improvement of hospital service system.

Tangibles

About 7.1% of patients were dissatisfied with the maintenance of waiting room before the improvement of hospital service system and after improvement the situation was better as none of the patient perceived as the same. Providing information on self care, there were 7.1% patients were dissatisfied before the improvement while after improvement none of patient was dissatisfied. Regarding provision of information on TB treatment 6.1% patients were dissatisfied before improving hospital service system as compared to none after improvement. Before improvement 4.0% patients were dissatisfied on the instructions given in the hospital whereas none of the patient was dissatisfied on the instructions given in the hospital.

Reliability

About the safety of patients in hospital, before improvement in service system there were 19.2% patients who remained dissatisfied on the safety in the hospital as compared to none after improvement. On the available facilities for providing care one-third of the patients (32.3%) were satisfied whereas after improvement less than half of the patients (45.9%) were satisfied. More than half of the patients (57.6%) were satisfied on doctor's expertise as compared to 67.3% after improvement. The results for the satisfaction of the patients on the method of doctor's physical examination were better after improving the service system (67.7% vs 70.4%).

Responsiveness

Before improvement, 5.1% of the patients were dissatisfied regarding concern of staff on the health problems as compared to none after improving the service system. For the punctuality of the doctor, 5.1% of patients were dissatisfied before improvement whereas none of the patient was dissatisfied after improvement. Before improvement two-third of the patients were satisfied on the information on TB and its treatment. It was a little better after improvement (66.7% vs 67.3%).

Assurance

For understanding the patient's feeling by hospital staff, the results show that before the improvement of hospital service system 6.1% patients were dissatisfied as compared to none after improvement. Regarding the courtesy of hospital staff, there was improvement on the satisfaction of the patients before and after improving the hospital service system.

Empathy

Regarding the time given by the doctor to discuss the health problems with the patients, nearly one third of the patients (30.3%) were dissatisfied before improvement whereas after improvement none of the respondent was dissatisfied. For privacy in the examination room, half of the patients (50.5%) were satisfied as compared to 55.1% after improvement.

Table 18: Percentage of TB patients on patient satisfaction before and after improvement of hospital service system by items

Item	Before (n = 99)					After (n = 98)				
	Very satisfied	Satisfied	Un-certain	Dis-satisfied	Very dissatisfied	Very satisfied	Satisfied	Un-certain	Dis-satisfied	Very dissatisfied
Cleanliness of the TB Clinic	1.0	59.6	37.4	2.1	0.0	4.1	70.4	25.5	0.0	0.0
Maintenance of the waiting room.	0.0	30.3	62.6	7.1	0.0	5.1	60.2	34.7	0.0	0.0
Readiness of the equipment in the examination room.	22.2	75.8	1.0	1.0	0.0	21.4	75.5	3.1	0.0	0.0
Instructions given in the hospital.	0.0	59.6	36.4	4.0	0.0	2.0	70.4	27.6	0.0	0.0
Information on TB treatment.	0.0	34.3	59.6	6.1	0.0	7.1	70.4	22.4	0.0	0.0
Information on self-care.	0.0	25.3	66.7	7.1	1.0	10.2	57.1	32.7	0.0	0.0
Method of doctor's physical examination for diagnosis	10.1	67.7	21.2	1.0	0.0	15.3	70.4	14.3	0.0	0.0
Doctor's expertise.	8.1	57.6	32.3	2.0	0.0	19.4	67.3	13.3	0.0	0.0

Table 18: Percentage of TB patients on patient satisfaction before and after improvement of hospital service system by items (continued)

Item	Before (n = 99)					After (n = 98)				
	Very satisfied	Satisfied	Un-certain	Dis-satisfied	Very dissatisfied	Very satisfied	Satisfied	Un-certain	Dis-satisfied	Very dissatisfied
Nurse's skill in providing care.	22.2	72.7	4.0	1.0	0.0	23.5	68.4	8.2	0.0	0.0
Facilities in providing care.	6.1	32.3	59.6	2.0	0.0	15.3	45.9	38.8	0.0	0.0
Safety in hospital.	2.0	15.2	61.6	19.2	2.0	8.2	58.2	33.7	0.0	0.0
Punctuality of doctor	6.1	57.6	31.3	5.1	0.0	13.3	66.3	20.4	0.0	0.0
Information on TB and its treatment.	8.1	66.7	24.2	1.0	0.0	8.2	67.3	24.5	0.0	0.0
Availability of staff in providing service.	22.2	64.6	13.1	0.0	0.0	26.5	63.3	10.2	0.0	0.0
Concern of hospital staff on your health problem.	1.0	40.4	52.5	5.1	1.0	6.1	60.2	33.7	0.0	0.0

Table 18: Percentage of TB patients on patient satisfaction before and after improvement of hospital service system by items (continued)

Item	Before (n = 99)					After (= 98)				
	Very satisfied	Satisfied	Un-certain	Dis-satisfied	Very dissatisfied	Very satisfied	Satisfied	Un-certain	Dis-satisfied	Very dissatisfied
Understanding of hospital staff on your feelings.	2.0	34.3	57.6	6.1	0.0	6.1	61.2	32.7	0.0	0.0
Courtesy of hospital staff.	2.0	67.7	29.3	1.0	0.0	4.1	78.6	17.3	0.0	0.0
Doctor's confirmation of the treatment's result.	43.4	51.5	4.0	1.0	0.0	41.8	52.1	6.1	0.0	0.0
Privacy in the examination room.	43.4	50.5	5.1	1.0	0.0	41.8	55.1	3.1	0.0	0.0
Allocated time of doctor to your health problem as needed.	2.0	9.1	57.6	30.3	1.0	7.1	60.2	32.7	0.0	0.0

4.4.2 Comparison of patient satisfaction before and after improvement of hospital service system

Table 19 presents the mean scores of overall patient satisfaction and its dimensions. It was found that the mean scores for overall patient satisfaction before improving were 69.9 ± 4.4 (mean ± standard deviation) as compared to 75.0 ± 2.9 after improvement. Mean scores for tangibles, reliability, responsiveness, assurance, and empathy were increased after the improvement of hospital service system. Using paired t-test, the difference was statistically significant at $p < 0.001$ for each dimension. Therefore it was concluded that each dimension of patient satisfaction was better than before the implementation of hospital service system.

Using the paired t-test, the difference was statistically significant at $p < .001$. Therefore it was concluded that the patient satisfaction in improved hospital service system was better than the previously working service system. So the hypothesis that patients' satisfaction after implementation will be better than before was accepted.

Table 19: Comparison of means of patient satisfaction of 99 patients

Variable	Before	After	p-value *
	Mean ± SD	Mean ± SD	
Overall patient satisfaction	69.9 ± 4.4	75.0 ± 2.9	< .001
Tangibles	21.0 ± 1.7	23.0 ± 1.3	< .001
Reliability	18.1 ± 1.8	19.7 ± 1.4	< .001
Responsiveness	14.9 ± 1.2	15.7 ± 1.1	< .001
Assurance	11.4 ± 1.2	12.0 ± 1.1	< .001
Empathy	7.2 ± .98	8.1 ± .89	< .001

* p-value by paired t-test

4.5 Treatment adherence

Self care practices of TB patients were used to measure the treatment adherence among TB patient. To measure self care of TB patient's, researcher used a close-ended questionnaire that included ten items to get the information on self care and ultimately the treatment adherence among TB patients. Table 20 presents the level of treatment adherence among TB patients before and after improvement of hospital service system. It was found that before improvement more than three fourth of the patients (76.8%) needed improvement in their treatment adherence or self care practices whereas after improvement less than half of the patients (43.9%) were needed for improvement.

Table 20: Percentage of treatment adherence of TB patients before and after improvement of hospital service system

Variable	Before (n = 99)	After (n = 98)
Treatment Adherence		
Good	2.0	2.0
Moderate	21.2	54.1
Need for improvement	76.8	43.9

4.5.1 Percentage of treatment adherence before and after improvement of hospital service system by items

Table 21 presents the percentage of treatment adherence which was measured by the self care practices of the TB patients. It was found that before the improvement of hospital service system more than one third of the patients (36.4%) were never performing breathing exercise to make their lung function well whereas after improvement none of the patients who was never performing breathing exercise. Only 6.1% patients were never taking anti-TB drugs while after improvement there was none of the patient who never took anti-TB drugs for the treatment of his/her

disease. More than half of the patients had meals that were sometimes composed of meat, vegetable, rice and fruits as compared to after improvement when results were a little better (56.6% vs 41.8%). For the patients who sometimes left the room in case a person started smoking, the results were better after improving service system (24.2% vs 16.3%). To avoid working in a smoky place, before the improvement, 24.2% respondents had this practice sometimes, which was slightly better after improvement (19.4%). To collect the sputum in a small box with cover, it was found that before the improvement of hospital service system more than one third of the patients (39.4%) sometimes does this practice whereas after improving this practice was improved to 21.4%. The results show betterment in the results after improving service system for those who sometimes avoided staying at a crowded place (19.2% vs 1.0%). 9.1% sometimes lived in a cross ventilated room and after there was improvement as7.1%.

Table 21: Percentage of treatment adherence among TB patients before and after improvement of hospital service system by items

Item	Before (n = 99)				After (n = 98)			
	Regularly	Often	Sometime	Never	Regularly	Often	Sometime	Never
Taking anti-TB drugs.	51.5	38.4	4.0	6.1	61.2	37.8	1.0	0.0
Live in a cross ventilated room.	21.2	69.7	9.1	0.0	24.5	68.4	7.1	0.0
Visit to hospital for follow up treatment.	47.5	39.4	13.1	0.0	48.0	42.9	9.2	0.0
Meals are composed of meat, vegetable, rice and fruits.	2.0	35.4	56.6	6.1	4.1	53.1	41.8	1.0
Perform breathing exercise to make lung function well.	1.0	12.1	50.5	36.4	2.0	51.1	46.9	0.0
Leave the room if a person starts smoking there.	9.1	64.6	24.2	2.0	8.2	75.5	16.3	0.0
Avoid working in a smoky place.	7.1	68.7	24.2	0.0	12.2	68.4	19.4	0.0

Table 21: Percentage of treatment adherence among TB patients before and after improvement of hospital service system by items (continued)

Item	Before (n = 99)				After (n = 98)			
	Regularly	Often	Sometime	Never	Regularly	Often	Sometime	Never
Collect sputum in a small box with cover.	15.2	43.4	39.4	2.0	30.6	48.0	21.4	0.0
Avoid staying in a crowded place.	22.2	57.6	19.2	1.0	67.4	31.6	1.0	0.0
Consult with the doctor if there is any health problem e.g. side effects.	50.5	40.4	9.1	0.0	80.6	19.4	0.0	0.0

4.5.2 Comparison of treatment adherence before and after improvement of hospital service system

Table 22 summarized the mean scores of overall treatment adherence and individual items. Paired t-test was used to calculate the mean difference before and after improving the service system. It was found that the mean scores of overall treatment adherence were increased after improvement and statistically significant at $p < 0.001$. Therefore it was concluded that the treatment of TB patients in improved hospital service system was better as compared to the previously working service system. So the hypothesis that treatment adherence among TB patients after implementation of hospital service system will be better than before was accepted.

The difference of mean scores for taking anti-TB drugs, meals composed of meat, vegetable, rice and fruit, performed breathing exercise to make lung function well, collection of sputum in a small box with cover, avoided staying at crowded place, and consulting with the doctor if there was any health problem like side effects before and after improvement were statistically significant at $p < 0.001$. For leaving the room if a person a start smoking before and after improvement was statistically significant at $p = .012$. For avoid working at smoky place before and after improvement was statistically significant at $p = .032$. For living in a cross ventilated room was not statistically significant at $p = .058$ before and after improvement. For visiting hospital for follow up was not significant at $p = .158$ before and after improvement.

Table 22: Comparison of treatment adherence for individual items of 98 TB patients

Variable	Before	After	p-value *
	Mean ± SD	Mean ± SD	
Overall treatment Adherence	16.6 ± 2.6	19.2 ± 1.9	< .001
Taking anti-TB drugs.	2.4 ± 0.8	2.6 ± 0.5	.001
Live in a cross ventilated room.	2.1 ± 0.6	2.2 ± 0.5	.058
Visit to hospital for follow up treatment.	2.3 ± 0.7	2.4 ± 0.6	.158
Meals are composed of meat, vegetable, rice and fruits.	1.3 ± 0.6	1.6 ± 0.5	< .001
Perform breathing exercise to make lung function well.	0.8 ± 0.7	1.6 ± 0.5	< .001
Leave the room if a person starts smoking there.	1.8 ± 0.6	1.9 ± 0.5	.012
Avoid working in a smoky place.	1.8 ± 0.5	1.9 ± 0.6	.032
Collect sputum in a small box with cover.	1.7 ± 0.8	2.0 ± 0.7	< .001
Avoid staying in a crowded place.	2.0 ± 0.7	2.7 ± 0.5	< .001
Consult with the doctor if there are any health problem e.g side effects.	2.4 ± 0.6	2.8 ± 0.4	< .001

* p-value by paired t-test

4.5.3 Treatment adherence before and after improvement of hospital service system

The TB 09 report for 1st quarter 2008 from District Hospital, Rawalpindi showed that among 172 patients registered during this period, 27 smears positive, 141 smear negative, and 4 were retreated cases. 9 patients cured, 132 completed treatment, 2 died, 20 defaulted, and 9 were transferred out.

In this study among 99 TB patients, 25 were smears positive, 74 smears negative, 2 defaulted and 1 patient died.

The comparison of treatment outcomes before and after intervention indicated (table 23) that there was significant improvement in the treatment outcomes after the improvement of hospital service system. The cured rate was increased from 5.3% to 17.2%, and treatment completed from 76.7% to 79.8%. Whereas decrease in defaulted from 11.6% to 2.0%, and transferred out from 5.2% to 0.0%.

Table 23: Number and percentage of treatment outcomes

Outcome category	Before[1] (n = 172)	After[2] (n = 99)
	Number (%)	Number (%)
Cured	9 (5.3)	17 (17.2)
Treatment completed	132 (76.7)	79 (79.8)
Died	2 (1.2)	1 (1.0)
Failure	0 (0.0)	0 (0.0)
Default	20 (11.6)	2 (2.0)
Transferred out	9 (5.2)	0 (0.0)

[1] Data from quarterly report of 172 TB patients during 1st quarter 2008 of Rawalpindi District Hospital

[2] Calculated from 99 TB patients participated in the intervention

CHAPTER V
DISCUSSION

This study aimed to improve the hospital service system by using the concept of chronic care model in order to increase treatment adherence among TB patients at Rawalpindi District Hospital. This chapter presented the discussion on research findings described in chapter IV also the results were compared with various studies. For discussion point of view this chapter was divided into four parts. First part: improvement of hospital service system; second: quality of hospital service system; third: patient satisfaction; and in the fourth part: treatment adherence of TB patients.

5.1 Improvement of hospital service system

The process of improvement of hospital service system was divided into three phases:

5.1.1 Phase 1: Preparation

Based on the informal interview from the patients and staff, it was found that patients had a good image of TB clinic before they reported for the treatment. The main reason was that Rawalpindi District Hospital is a tertiary care hospital with a number of modern facilities. Their expectations were not fulfilled because of unfriendly behavior of doctor, difficult accessibility, long waiting times and lack of providing the disease related information. One of the male patients narrated *"doctor does not examine the patients on their turn"*. Another male patient who stopped his work due to disease and was waiting to see the doctor since three and half hours felt *that "waiting for such a long time without any proper place of sitting is making my disease more severe"*. It resulted in the lack of confidence on the treatment and distrust of the doctor and staff. Thus the non-adherent to the treatment was the expected outcome. The healthcare staff was over burdened by additional duties and uncertainty in the work at same place resulted in the decreased interest with the

patients. In addition to this staff was not trained enough with updated techniques to manage the TB patients.

This phase provided a better understanding on the process to improve the hospital service system using the concept of chronic care model. It was considered a best technique to interview with the staff and patients to locate the shortcomings and then bring changes for the improvement of healthcare services. The similar conclusion was made in one study that compared the views of patients and staff for the improvement of quality of services. (126)

5.1.2 Phase 2: Implementation

This phase was concerned with the application of the concept of chronic care model for the improvement of hospital services. It was discussed under individual component of chronic care model.

1. Hospital Administration/healthcare organization: The hospital provided all the support to implement the changes recommended during the improvement process. It was due to understanding the process and the usefulness of the study. It provided a positive message to the members of healthcare team working in TB clinic. The similar conclusion was made in one study (127) that the active involvement of hospital administration has a greater impact on the working ability of the staff and results in the improvement in the quality of care.

2. Self-management support: It was obvious from the results of this study that recognizing patient's central role for the management of TB and providing knowledge and education promoted treatment adherence of TB patients. The results of one study (128) were congruent with this study that if the healthcare staff understands the patient's centered approach, it could be a positive experience for the staff as well as for the patients also.

3. Decision support: It was found that healthcare staff with updated knowledge for the management of TB provided a basis to improve the hospital service system as a result treatment adherence was increased. The similar results were found in one study carried out in South Africa (84) that insufficient knowledge and

understanding of the healthcare staff on the management of TB patients undermined the effectiveness of services and leads to the system failure.

4. Delivery system design: as the laboratory reports were sent directly to the TB clinic and within the set time table, there was shortening of the waiting times. Moreover assigning the duties to healthcare staff was also a factor to decrease the waiting time. Increased waiting time not only causes frustration to the patients but it was responsible for the spread of disease from the TB patients to those who might not be suffering from TB at that time. One study in US (129) concluded that even TB patients and the suspects were treated in emergency departments but prolonged waiting time and lack of infection control facilities are responsible for the spread of disease

5. Information system: it was found that information system was a good tool to update the patients about the process of treatment and timely appointments. Similar conclusion was made by Fraser et al. (89) that information system if focused on holding the patients from the initial diagnosis and intensive phase appeared to be a good strategy to increase the treatment compliance of TB patients

6. Community: Community visits by hospital staff were a source of social support for the TB patients. It involved community as whole and reduced the cultural and social barriers towards TB. The same conclusion was made in one study (130) that community involvement contributes comprehensively to reduce the burden of TB and recommended to enhance the role of community and community resources may be used for TB control

5.1.3 Phase 3: Evaluation and re-enforcement

As the results of this study were evaluated and further improvement was recommended, thus it was indicated that the trend of continuous improving the hospital service system would continue in future also.

5.2 Quality of hospital service system

Quality of hospital service can be understood as the provision of the services that are suitable according to explicit needs of the patients. Hospitals play an important role to improve the health of general public and protecting them from the

harmful effects of various diseases. Good level of service quality is one that can meet the changing demands of the patients.

The overall quality of hospital service system as responded by almost all the patients (94.9%) needed improvement (table 14). Using the chronic care model for improvement of the hospital service system brought a positive change and fewer patients (6.1%) responded as needed improvement. The chronic care model provided multi-dimensional approach to improve the quality of hospital service system. Chronic care model focused on increasing the capability of healthcare staff, active involvement of hospital administration and using the community resources to bring about the impact on the management of TB patients. All the efforts resulted in well informed and motivated patients who are willing to complete the entire course of TB treatment. In one study (131) similar findings were observed for the description and application of chronic care model in practice.

The reasons behind the improvement found in the hospital service system were: reducing the waiting time, creating discipline in the TB clinic making easy access to the doctor, provision of information on TB disease, treatment and side effects of anti-TB drugs, improvement in communication between doctor and patients, doctor and staff discussed about the patient's concerns, good doctor patient relations, improving efficiency of laboratory tests, and friendly behavior of doctor and staff. Support and personal involvement of the hospital administration was very important and it solved all the related problems. In many occasions healthcare staff was offered incentives to work efficiently for improvement in the quality of services but during this research no incentives were offered instead a reward system in the shape of certificate was introduced that motivated the team and improved their work. The similar conclusion was made in study (132) that making the services and control programs to be sustainable and effective health system need to change and enable the services in such a way so that incentives are created to reward improvements in efficiency and outcomes.

The dimensions of quality of service system (table 14) indicated that each individual dimension was better after improvement in hospital service system. Accessibility of the patients to the hospital services was increased 75.8% vs 19.4% before and after respectively. Making the easy accessibility of the hospital services for the patients is considered as relieving of stress of disease. Similar recommendations were given in one study (133) that problems to access to the care is additional dimension that makes the illness more troublesome and needs to be overcome. Increased accessibility to healthcare services improved the case detection rates and patients satisfaction. It was concluded in one study (134) that increasing the accessibility to healthcare services had improved quality of the delivery system which in turn supported adherence to pulmonary TB patients. Regarding continuity of care 31.3% responded that there was need for improvement whereas after improvement only 13.3% responded that there was need for improvement.

Counseling was improved to 49.0% vs 98.0% before and after improving the hospital service system respectively. The role of counseling plays an important part to remove the social and cultural barriers and increase the treatment adherence because the elderly, the less educated, women, and those living far from health facilities face the longest delays in reaching TB services and achieving diagnosis. This finding was congruent with results of one study in china. (135) Effective improvement was found in drugs and side effects. Before improvement 67.7% perceived as need for improvement whereas none of the patient responded that improvement was needed. Logistics and supplies were improved similarly before improvement 50.5% responded need for improvement whereas 18.4% responded as needed improvement. Availability of good quality anti-TB drugs, a well equipped laboratory with timely reports were an important part in the improved hospital service system. Improvement in the logistics and supplies was due to timely reports from the laboratory and trust of the patients on the quality of anti-TB drugs provided in the hospital.

Community visit program of healthcare team was another change introduced in the hospital service system and it provided the opportunity to access the

patient needs and provided the necessary information on TB, encouraged patients living in the same community thus reducing the societal misunderstandings about TB. It was according to one of the element of chronic care model that helped to increase treatment adherence among TB patients. The results of one research conducted in North Ethiopia (136) were consistence with the findings of this study that the TB club approach has a significant impact in improving patients' compliance to anti-TB treatment and in building positive attitudes and practice in the community regarding.

5.2.1 Quality of hospital service system before and after improvement by its dimensions

The results of improvement of hospital service system were summarized in table 14 and discussed by each dimension as follows:

Accessibility:

To provide the services promptly and effectively are considered as a measure of easy accessibility. Before improvement about half of the patients (50.5%) responded that services were never provided within short period of time which was as compared to 4.1% after improvement. During informal group discussion with patients two female patients one of them was married felt that "*doctor and staff has no concern with the patients, in case we will not reach home in time today, it will be difficult to continue the treatment*". There are multiple factors that were responsible for the provision of services with in short period of time. From patient's comments, doctor has to perform additional duties along with TB clinic and lack of discipline was the main reasons. Nevertheless long waiting time is one of the reasons to create distrust on the treatment and the healthcare services. In order to improve treatment adherence it is required that this delay in diagnosis must be reduced. The same was concluded in a study that was carried out in Punjab, Pakistan (137) and concluded that delay in providing treatment is due to inefficiently working health system and patients could not be blamed for that non compliance. Long waiting times decrease the patient satisfaction and could lead to non-compliance for the TB patients. Similar conclusions were made in one study (138) that the more the patient will spent time spent with the

physician, more will be the compliance with treatment and it was better than is the time spent in the waiting room. The results suggested that shortening patient waiting times would be more productive.

Another aspect to increase accessibility was by guiding the patients with clear direction boards. One third of the patients (36.4%) never found direction boards for guidance in the hospital whereas it was better after improvement to be 5.0%. The views of an old patient with no education *"I came to this hospital first time, it is very big hospital and packed with patients at OPD, I am trying to find the exact place for having treatment and it took one hour to reach at TB clinic"*. A well informed hospital management team always understands the importance of the directions boards for the patients but this function was overlooked due to lack of interest. It was recommended in one study (139) that the guidance promoted readinesses of the patients if it is provided with background of the experiences of health and caring with nurses and using their own resources

In order to improve the quality of service system, the role of the doctor is very important. Before improving the services patients (23.2%) perceived that doctor's behavior was unfriendly that was positively changed after improving the service system. On the patient's perspective doctor was not friendly because most of the time there was a new staff on duty and they feel difficulty to express the same problems again and again. It was the common problem among patients and healthcare staff. New staff including doctor takes its time before they get familiar with the working conditions in TB clinic. A small group of patients including two female and one patient was probed to find the reasons of improvement. Every patient was satisfied with the behavior of doctor and staff *"doctor and other staff is very good, listened us perfectly and given advise in a nice way every time when we visited"*.

The positive change in the behavior of doctor and staff was observed with their training on the concept of chronic care model and TB DOTS program and assurance from the hospital administration that they will not be transferred. This intervention improved knowledge to treat TB patients and thus increased the level of

confidence. The results of one study (140) were consistence with the findings where it was found that patients need more information on the treatment and conditions, in a friendly behavior from health professionals and attending them with harmonious relationships. It could result in a healthy impact of the health care system. Similar conclusion was made in one research carried out in Philippines. (141)

The results of this study indicated that information on available services (16.2%) was never provided to the patients before improvement. In order to identify the reasons behind this situation, researcher got the comments of the doctor and staff. The doctor justified that it was duty of the hospital administration to make the proper arrangements so that patient's get the information about the available services in the hospital. The good change was seen after the improvement of service system (2.0%) was due to placing the posters and fixing a few informatory boards at various places in the hospital. It increased the patient's knowledge about available services which significantly contribute to the improvement in the quality of the services to be rendered.

The study revealed that before improvement there was inconvenience in service hours as perceived by the patients (9.1%). TB patients are mostly related with the working class and morning hours were not suitable for all the patients. Two young patients ages 24 and 31 years were interviewed at different occasions; both were employed in a private company were afraid *"due to morning hours of TB clinic, it is difficult to get leave for treatment as we have never told anybody about our disease"*. Women in Pakistan are mostly housewives so they can attend TB clinic very easily in the morning times. On the other hand male population have to go for work and TB clinic in the morning hours sometimes do not suit them especially when the waiting hours were long and uncertain. It was suggested in one study (142) that the health services must be provided in such a way so that the working population may have it at convenient hours and to be more vigilant to screen persons with pulmonary symptoms among the elderly.

Continuity of care:

To maintain the continuity of the care, the schedule of appointments needs to be according to treatment schedule. The results indicated that nearly one fifth of the patients (19.2%) responded that the hospital staff never gave appointments according to the treatment schedule which was better (0.0%) after improvement. This finding can be explained on the basis of the comments given by the patients; *"we cannot see the doctor since two days as laboratory results are not completed yet"*. There was no connection between laboratory and TB clinic so the patients have to collect the results from the laboratory by themselves. Most of the times the appointment schedule was disturbed due to delayed laboratory reports. It made the patients to visit the hospital again and again until the final diagnosis and treatment. After improvement the situation was better due to the reason that laboratory reports were sent to the TB clinic directly without delay. Direct link of TB clinic and laboratory filled this gap that was creating irregularities in providing appointments and delay in the registration of TB patients. The treatment delay between diagnosis and initiation of therapy must be minimized, so that patients can follow the appointments according to the treatment schedule. It was found in one study (143) that if the sputum results from the laboratory and suspects from TB registers were monitored properly, could potentially reduce the patient delay and thus minimize the risk to lose the patient. Laboratory work needs to be updated as initiation of treatment can be delayed due to an incomplete registration or incomplete results

The results of this study revealed that some of patients (6.1%) responded that they never found the same staff on duty on successive visits. Although it was better after improvement but this can be explained on the reason that before improving the service system, the services were managed by day to day management system that means doctor and staff were deputed according to the daily needs and no permanent staff system was existing. As the hospital administration came to know the problems in the TB clinic, permanent staff was deputed who were provided trainings to update their knowledge before the implementation of service system. The affect of same staff in TB clinic was important to get understandings with the patient's behavior, patient's trust on treatment and working of the staff itself. The result of this

study is congruent with the result of one research (144) with the conclusion that the case detection and treatment adherence among TB patients were dependent effectiveness of the same staff providing the treatment.

Before improvement despite providing effective treatment, some patients (6.1%) perceived that treatment was never in progress. During the informal group discussion two patients one male and another female, visiting the TB clinic for follow-up were dissatisfied as *"new doctor and clerk do not understand my disease how he can treat me well"*. Female patient was worried about the privacy *"examination room was not closed while doctor having my check-up, waiting outside the doctor's office is troublesome"*. Based on the comments of the TB patients it was found that due to changing duties of the staff, unfriendly behavior of doctor and less punctuality of the staff gave this impression that treatment was not in progress, although diagnosis and treatment given was correct. It means for the treatment of TB especially other factors as explained by the patients were also important because on improving the inter-personal communication and same staff on duty resulted in the betterment of the services. These results were similar as found in another study (141) that good communication skills of increased the relations between doctor, staff, and patients resulted in the substantial improvement in services for TB patients.

Counseling:

Regarding the time spent by doctor on discussion, there were 64.5% patients who responded that the doctor never spent time to discuss the fears and concerns about the disease as compared to only 2.1% after improvement. A small group of patients including two middle aged and two female explained that *"the doctor have no time to listen the problems of the patients and focus only recording the brief history"*. This improvement in the results was due to the affect of trainings on chronic care model - self management support, patient's central role in the management of their disease and decision support by providing recent information on TB DOTS were proved to be very useful. It motivated the doctor and staff to take much interest with the treatment and management of TB patients.

Efforts to improve treatment outcomes require better understanding of adherence as a complex behavioral issue and of the particular barriers like social stigma. Using effective counseling techniques like active listening and body language were very helpful to improve treatment adherence. One study in Thailand (145) found that due to the effect of social barriers especially stigma related to TB, unless sufficient education and knowledge was not provided by the healthcare staff adherence to treatment for TB and HIV-infected TB patients was difficult to predict.

The doctor and healthcare staff provided all the necessary information about TB and educated them on self care practices to make patients more responsible for compliance with the treatment. These results were congruent with the research conducted in rural Pakistan (124) that due to limited knowledge about the TB, normally the health care providers take considerable time to make a correct diagnosis of the TB while on some occasions the diagnosis was incorrect. That's why most of the patients were dissatisfied with the service provided to them. Majority of the patients reported problems with access to treatment, particularly the women. They concluded that the important reasons for non-compliance were due to improper provision of treatment rather than the patients' responsibility to comply.

Regarding the supply information about the disease more than half of the patients (52.5%) responded that it was never provided which was better after improvement as 2.1%. Based upon the comments by the patients, this situation was improved due to *"the interaction of doctor and staff was friendly, concerned with their health problem and providing all information needed"*. The main reason lies behind this betterment was performance of the staff that has developed good understanding on TB due to trainings workshops before implementation of improved hospital service system. It can be the affect of positive behavior of staff that played a vital role in removing the social barriers and building the confidence of patient on treatment. Similar conclusion was found in one study in Nepal (146) that good relations between hospital staff and patients increased patient's trust and confidence on the treatment

As the results indicated that before improving the services patients (30.3%) responded that hospital staff never gave advice to solve their problems. Based on the dialogues with the TB patients in an informal group discussion, their main concern was *"fear about losing the job due to TB, reaction of family and community when they will be disclosed as TB patients"*. Female patients who married were particularly afraid of rejection from the family. The doctor not only reassured the patients but their families were also educated to support the patient during treatment rather to isolate. Expertise of the physician and staff is important in this situation. This improvement resulted due to updating the physician's knowledge, with better communication style and spending appropriate time to suggest solutions for the disease related problems. The same conclusion was made in one research carried out in the urban districts of Ghana. (147)

For understanding specific needs of the patients, patients (29.3%) perceived staff never understood their specific needs as compared to 3.1% after improving the service system. Based on the information provided by the TB patients the specific problems were: nature of the job and its effect on disease; affect of hard work and least rest, kind of diet required during disease; living conditions and financial burdens affects the disease etc. Patients required discussing these problems with the healthcare team until their own satisfaction. These problems needed attention of healthcare staff so that a clear understanding on these issues can be made because non-satisfaction of TB patients leads to non-adherence to treatment. The results of studies carried out in China (148) and New York city (149) were similar to the findings of this study as it was concluded that low income and financial crisis, no social support, personal characteristics and fear of drug reaction are important factors related to non-adherence.

Giving individualized attention helps to improve treatment adherence that can reflect improvement in the service system. Patients (36.4%) responded that individual attention was never given before improvement as compared to 2.0% after improvement. individualized attention refers to the doctor's style while taking the medical history, and showing flexibility to accommodate patient's requirements and

disliking. Role of counseling is important like the back bone in the management of TB. If the healthcare team ignores it, adherence to treatment cannot be ensured. The findings of two studies (146, 150) suggested that health education and counseling could make an impact on the decision of TB patients to conform to a rational choice regarding the treatment. Giving individual attention to patients is necessary to ensure treatment adherence among TB patients.

Drugs and side effects:

Providing necessary information about the side effects of TB drugs improves treatment adherence because it removes the stress related to anti-TB drugs. The results showed that more than half of the patients (57.6%) responded that information about the side effects of the TB drugs was never provided as compared to 4.1% after improvement. The reason behind this improvement was related to the self support management and information system of the chronic care model. Patients were given all the information about TB and its management and never to miss the appointments. It resulted in the change of patient's perception and treatment of TB. In one study carried out in Indonesia (151) revealed that it is necessary for increasing treatment adherence to provide health education on treatment duration and side effects of the drugs

For the quality of the drugs given to them, patients (28.3%) responded that sometimes quality of anti-TB drugs was good. But after improvement none of the patients responded that quality of anti-TB drugs was sometimes good. The results of this study were congruent with one research (152) that recommended a strong drug procurement and management system is critical for the success of TB control efforts

Logistics and supplies:

Supplies of anti-TB drugs and other logistics like laboratory regents, reporting recording material is an important component of DOTS strategy. It was found that more than half of the patients (51.5%) responded that laboratory tests were never done without delay as compared to 6.1% after improvement. Before improving the service system, there was lacking interconnection between TB clinic and

laboratory. Patients were required to collect the results by their own and there was no supervision from the administration side. It was resulted in relaxed attitude of laboratory staff. The improvement in the laboratory services was observed by sending the reports directly to TB clinic within the set time limits.

Sputum test for acid fast bacteria is one of the five elements of DOTS strategy. It is cost effective and gives results with more accuracy than x-rays or other routine tests. Delay in performing laboratory test means that quality of service is not up to a good standard. This delay is attributed to frustration and non-compliance to the results. These results are consistence with the recommendations of the task force to the National plan for reliable laboratory. (153)

This improvement in laboratory work was resulted due to careful sputum testing in the laboratory which made it easy for the physician to confirm suspicion of TB despite any previous clinical and x-ray findings. The training of laboratory technicians on standardized procedures, and safety measures was important to improve the overall quality of the services for TB patients. The similar results were concluded in one study (154) that the laboratories should be redesigned to conform to international TB diagnostic centers, with well trained staff and proper safety procedures.

5.2.2 Comparison of quality of hospital service system before and after improvement of hospital service system

The results revealed that the difference of overall quality of hospital service system and all the dimensions before and after were statistically significant at $p < .001$ (table 16). Improvement in the quality of hospital service system was as a result of increasing accessibility, providing continuity of care, counseling, and ensuring efficient supply of drugs and logistics. The quality of care was improved by reducing waiting hours, by friendly attitude of all the staff and doctor working in TB clinic, good communication between doctor and patients and supply of all necessary

information about the disease. These findings were congruent with a study in Nigeria. (155)

5.3 Patient satisfaction

Patient satisfaction is considered as the degree to which the individual patient perceives regarding the provision of healthcare services that are delivered as useful and according to the needs.

Before improvement the overall patient satisfaction as perceived by the patients (19.2%) needed improvement as compared to none after improvement (table 17). Increased patient satisfaction after improving the services means that the outcomes of the intervention were in the right direction. They were as a result of collective efforts on the part of hospital administration, healthcare team, and successful application of the chronic care model for managing the TB patients in outpatient department. The results showed that overall patient satisfaction was mainly due to the appropriate time spent by the doctor to solve the health related problems of the patients. The other contributing factors to increase patient satisfaction were provision of a separate waiting room, providing information on self care, and understanding the patient's concerns. Similar results were found in one study (156) carried out in UK to measure the quality of patient care. The role of doctor and staff was vital to increase the level of patient satisfaction. The doctor due to additional duties and increased work load cannot perform well for patient satisfaction. It was assured to health staff for no additional duties so they work with full concentration.

The individual dimensions of patient satisfaction showed much improvement after improving the service system. For tangibles there was improvement 32.3% vs 0.0% before and after respectively. Improvement in this dimension indicated that the cleanliness of TB clinic, maintenance of waiting room, information on TB treatment and self care, and readiness of equipment in the examination were better after improving the services system. The improvement in the physical environment of the hospital is also a source of satisfaction for the patients.

They feel comfortable if cleanliness was seen in the hospital. Similar conclusions were made in one research that was aimed to measure the satisfaction in outpatient department of a university hospital. (157)

For reliability; there was improvement 26.3% versus 3.1% before and after respectively. It means that the method of physical examination, doctor's expertise, nurse's skills to provide care, facilities for care, and safety in hospital were improved individually. It was observed in one study (158) that improved communication skills of doctor and nurse with the patients ensures the satisfaction of the patients on the quality of service. For responsiveness; there was improvement 13.1% vs 0.0% before and after respectively. It could be the result of improvement in punctuality of doctor, availability of staff, and concern of staff with patient's health problems. For assurance; improvement 17.2% vs 7.1% was found before and after respectively. It indicated that courtesy of hospital staffs, understanding the patient's feelings, and doctor's confirmation of the results were improved individually. It was revealed in one study (159) that courtesy of entire medical staff and procedures to explain the patients about various aspects of disease were responsible to increase patient satisfaction For empathy improvement 24.2% vs 1.0% was found before and after respectively.

5.3.1 Patient satisfaction before and after improvement of hospital service system by its dimensions

The results of patient satisfaction by each dimension were presented in table 18 and discussed as follows:

Tangibles:

Patients' role to assess the quality of hospital services is increasingly recognized. Their specific experiences and needs provide concrete information to improve the care. Regarding provision of information on self care, there were 7.1% patients dissatisfied before improvement as compared to none after improvement. This behavior on the part of doctor and staff could be explained by comments from patients that lack of interest of doctor and insufficient knowledge of healthcare staff.

Providing update knowledge on the treatment and prevention of disease reflects doctor's expertise as the quality and patient education are associated with patient satisfaction. It was indicated in one research (160) that updated knowledge and friendly behavior of doctor's and staff are necessary for proving good quality services. Providing education on the preventive measures of the disease may also relate to improved patient satisfaction.

TB patients have a lot misunderstandings based on their beliefs and level of education. Two studies (161, 162) that were conducted in Ethiopia and Vietnam advocated the similar methods to manage TB and concluded that misconception about the spread, cure and side effects made TB a very dangerous disease which resulted in social avoidance to TB patients. It can be removed by health education in the hospitals providing treatment to TB patients.

For maintenance of waiting room, patients (7.1%) were dissatisfied before improvement of hospital service system whereas none of them dissatisfied after improvement. In order to ensure privacy, and to avoid transmission of TB a separate waiting room was allocated which improved the patient satisfaction. A well maintained waiting room for the patients was a source of reducing stress and tension. It gives a feeling of safety and protection in the hospital. This change was one of the reasons for betterment in the situation. With the same line of this study, it was recommended by the author (163) that rather more comfortable waiting rooms with great focus on interior designing will be provided in the hospitals in order to increase satisfaction of the patients.

Patient satisfaction is directly related to the positive inputs from the hospital and especially from the physicians and staff. As shown by the results that patients (34.3%) were satisfied by providing the information on TB treatment as compared to 70.4% after improvement. Hospital services are now using a patient centered approach and, as a result, the experience of patients and their experience and/or satisfaction is taken more seriously to improve the quality of services. In the community visits the healthcare team had discussed all those issues related to TB and

preventive measures in the spread of disease. Decision support, self management support and community linkages from chronic care model were responsible for this improvement. Less knowledge about TB and its treatment leads to non-adherence to TB treatment. It was further explained in one study (164) that updated knowledge of TB, correct diagnosis and treatment regimen, and incentives were contributing factors to increase treatment adherence.

For instructions given in hospital, patient satisfaction can be improved by giving treatment related instructions like time for the intake of drugs, how many times drugs were taken, instructions about meals, living conditions, breathing exercise, etc. were considered as an important part of treatment. In this study patients (59.6%) were satisfied on the instructions given in the hospital as compared to 70.4% after improvement. Based on the comments of the patients, the patients felt satisfied when they were provided necessary information on the side effects of TB drugs and course of treatment. Similar conclusion was made in one study (165) that in order to complete treatment, patients has to take these drugs every day, informing the side effects increases treatment adherence.

The importance of providing information about TB were acknowledged in two more studies carried out in China and India (148, 166) that apart from providing diagnostic and treatment facilities, patients must be provided sufficient knowledge on TB disease, its sign and symptoms, treatment, side effects of drugs and self care. It is necessary in order to remove the fear about disease, social stigma, and cultural barriers from the patient's mind otherwise non compliance will be the expected outcome.

Reliability:

Patient safety has become a major defining issue for healthcare. Results showed that the patients (19.2%) were dissatisfied on the safety in the hospital as compared to 0.0% after improvement. In a short interview from the respondents of this study revealed that due to high expectations with this hospital they were confident that quality of services and expertise of the doctor and staff will be greater. But

available facilities are not according to their needs and expectations. The most important one was the behavior of doctor or staff which was unfriendly on successive visits. The safety of patients is directly related to the physician and staff as prescription error and errors in diagnosis resulted in increased complexity of the disease. The patients felt unsafe in these conditions. Positive practice and attitude from hospital staff can reduce the sense of unsafe in the hospital. Similar discussion was made in one study (167) that in the recent years more and more attention was given on the issue of patient's safety in hospitals but it was still lacking the same support from the physicians and medical errors and injuries were common in OPD. It was specially seen in case of TB patients where they had a lot of quires that could be addressed properly. These results were supported by two studies carried out in Canada and India. (168, 169)

Responsiveness

Regarding concern of hospital staff on patient's health problem, results showed that 5.1% respondents were dissatisfied as compared to 0.0% dissatisfied after the improvement. During a short interview patients provided their comments that community visits and same staff in the TB clinic were the main reasons behind the improvement of this situation. It was found that if the physician fails to give proper attention on the health problem of TB patients, the possible outcome could be non-compliance with the treatment because in that case patients chose the other alternatives like going to private practitioners or self-medications. The results are in consistence with one study in Thailand (170) where it was concluded that the triad model, which emphasizes the role of a triad of persons (the healthcare provider, the TB patient, and his/her treatment supporter), can improve patient adherence to TB treatment regimen. The results showed that only about a quarter of TB patients chose the hospitals with TB clinic for first treatment, while others chose alternative healthcare modes, including self-care and purchasing drugs from drugstores

For punctuality of the doctor, more than half of the patients (57.6%) were satisfied before improvement as compared to two third (66.3%) after improvement. In order to improve quality of services in TB clinic outpatient department, the issues

like efficiency, punctuality, behavior of doctors and other staff, waiting time, supply of drugs and cleanliness of the hospital etc were considered very important and main emphasis was given on these issues. Strict adherence to appointment times was difficult to implement but it was important in determining waiting times. The results this study were congruent with the result of one (171) research that was based on the patient's analysis of his/her overall health-care experience. The problems identified were: difficulty of telephone contact, uncomfortable and lengthy wait, health staff smoking, scant interest from the doctor, no greeting on entry, interruptions during the visit, insufficient information and, punctuality of the doctor.

Assurance:

For understanding of patient’s feelings, before improvement of service system 34.3% patients were satisfied by the hospital staff as compared to 61.2% after improvement. It was indicated by the patients during a short interview that they felt stressful being diagnosed as TB but the friendly behavior of doctor and understanding the problem relieved most of the stress and they developed strong hope for cure. Doctor, his positive behavior, and good communication could be the valid reason behind the improvement of the situation. The conclusions of one study (172) are similar with this study that inter-personal communication to be an important aspect of successful health-care. Training courses which provide feedback have been shown to improve health professionals' ability to conduct successful interviews. To address the fear, concerns, stigma and other cultural barriers, it is necessary for the healthcare staff to be trained well for this situation. Unless proper training programs will not be organized, staff could not handle the patients according to their needs. It was suggested in one study (173) that delays in TB diagnosis seem to be due to the lack of awareness of patients and the incompetence of some health workers. Training and supervision of staff and TB information campaigns targeted at the population (transmission, symptoms and treatment) will improve TB control.

Regarding courtesy of hospital staff, the results showed that before improving the hospital service system more than two third of the patients (67.7%) were satisfied with courtesy of the hospital staff as compared to 78.6% after

improving. It seems to be a simpler technique to create good doctor-patient relations but proved as very effective to increase patient satisfaction. The conclusion of one study (174) was similar with this study.

Empathy:

The results showed that before improving hospital service system less than one third patients (30.3%) were dissatisfied on the time given by the doctor to discuss the health problems as compared 0.0% to after improvement. The reason for the improvement in this situation was attributed to the self-management support of chronic care model. Recognizing the central role of the patient for the management of the disease led the doctor and his team to help the patient realizing their responsibility to complete the treatment. Using this technique the patients were more confident to complete the treatment and follow the doctor's advice. Once the patients make the decision, they remain adhere with the treatment until cure. Similar conclusion was made in one study (175) as management of early symptoms of TB and adherence to medical treatment are main challenges in controlling TB. Role of healthcare staff dealing with TB patients becomes very crucial because they are in a position to guide the patients towards a right direction.

5.3.2 Comparison of patient satisfaction before and after improvement of hospital service system

The results showed that the means score of overall patient satisfaction were increased. The difference of overall patient satisfaction before and after was statistically significant at $p < .001$. All the dimensions were statistically significant at $p < .001$ before and after the improvement of hospital service system (table 19). It can be concluded that improved hospital service system could improve the overall patient satisfaction. The hypothesis that patient satisfaction will be better than before was accepted.

In order to increase the level of patient satisfaction physician and nurses plays a vital role. It was found in this study that significant increase in patient

satisfaction was the result of working as a team, providing all necessary information to the patients in a friendly manner.

5.4 Treatment adherence

Treatment adherence of TB patients was measured by the self care practices of TB patients. Self care practices are referred to those activities that were carried out by an individual, families, or the community as a whole to prevent the infectious diseases by improving personal hygiene.

Treatment adherence of TB patients was measured because it the key of success for TB control program, and a measure of service quality for TB patients. The results of this study revealed that before improvement of hospital service system there was 76.8% need for improvement as compared 43.9% after improvement (table 20). The improvement in the level of treatment adherence was due improvement in quality of hospital service system, patient satisfaction, and self care practices of TB patients. A short interview by the patients revealed that patients were well understood that unless they will not follow the instructions and advice from the hospital, complete cure could not be achieved. Treatment adherence was increased mainly due to taking anti-TB drugs regularly, performing breathing exercises and consultation with the doctor if there was any health problem. This change in the behavior was developed by the efforts of the healthcare team, their friendly manner to discuss the problems, and removing the misunderstandings about the disease played an important role for the improvement. It was indicated that patients were motivated to complete the full course of treatment because of the assurance that their own role is much important to get complete cure. Similar results were found in one study (176) where it was concluded that providing necessary knowledge on the preventive measures of TB patients is the responsibility of doctor and healthcare staff in order to achieve high case-finding and efficient case-management. The results of one study conducted in Bangkok (177) were similar as it revealed that the reason behind the low treatment success rate might be due to inadequate knowledge about TB among patients. It was emphasized that in order to achieve the targets it is necessary to provide health

education and information on the adverse effects of drugs for successful management of TB cases. Self care and other preventive measures therapy remains an important component in the control and management of tuberculosis.

Health education to TB patients and self care practices has no direct role in the treatment of TB but it is said these are very effective in holding the cases and thus reducing the delays and non compliance of TB patients. Seeking care from a medical doctor is a good practice on the part of TB patients because it is the source of reducing cultural barriers by providing knowledge on TB disease and self care practices. In another study (178) results are in consistence with our findings. The aim of this study was to determine the time taken for patients later confirmed as having TB to present with symptoms to the first health provider (patient delay) and the time taken between the first health care visit and initiation of tuberculosis treatment (health service delay).

Self care practices and health education to TB patients are helpful in reducing the delay in the case findings and treatment of TB patients. Self care practices like collection of sputum in covered jar, avoiding working in smoky place and avoiding staying at crowded places are helpful in reducing the transmission of the disease. Role of education and knowledge about TB, provision of effective TB drugs, availabilities of treatment facilities in Government hospitals and dispensaries, fears and concerns about TB and on self care practices is important to change the behavior and misconceptions about TB especially in illiterate groups of population. The results of another study (179) were similar with the study that extensive health education to bring a behavioral change through the involvement of community is needed to create awareness and remove the social barriers about TB.

5.4.1 Percentage of treatment adherence before and after improvement of hospital service system by items

The items included to measure treatment adherence were discussed as under:

Breathing exercise: The results presented in table 21 showed that the practice of breathing exercise was better after improving the service system at 36.4% vs 0.0%. The reason behind this improvement was self management support and information system of chronic care model. Patients were not only given necessary information but it was emphasized that their central role to manage the disease. Timely reminders and community visit program helped them to bring a healthy change in their routine work. Breathing exercises when carried out with supportive chemotherapy have a positive effect in reducing the symptoms of asthma thus improving the quality of life. It was concluded in one study (180) that yoga is proved to be helpful in the management of pulmonary tuberculosis as it reduced the level of infection, reduced the symptoms and improvement in radiographic picture, and weight gain.

Taking anti TB drugs: The practice of taking anti-TB drugs was improved among TB patients as 6.1% vs 0.0% before and after respectively. The particular reason behind this improvement was the comments of the patients' i.e doctor's expertise to diagnose and thus developing the trust on the treatment. As a result they were following the advice happily. On the other hand if a TB patient was not taking anti-TB drugs regularly, one or many factors were said to be affecting in this situation. These factors were discussed in one study (181) that those who did not take their drugs regularly have at least three reasons like adverse effects of anti-TB drugs, economic hardship, and stopped taking drugs when symptom disappeared

Collection of sputum: The practice of collecting sputum in covered boxes was not well developed as only 15.2% were doing it regularly. It was improved to 30.6% after improvement. The patients provided their comments that due to lack of knowledge they were not collecting the sputum in covered boxes. Proper coaching of the patients and provision of sputum cups improved their practice to collect the sputum in covered boxes both for laboratory and disposal purposes. The patients were properly coached about the correct method of sputum collection in the laboratory so that correct diagnosis could be made. Similar conclusion was made in one study (182) that correct method is important because for correct diagnosis and presence of acid

fast bacilli in the sputum. Clear instructions from laboratory staff on how to collect and deliver the morning sputum to laboratory are necessary for correct diagnosis.

Leaving the room if a person starts smoking: Results indicated that patient's practices on this subject were relatively better as about two third of the patients (64.6%) were doing it oftenly and there was improvement after improving the service system. The comments from the respondents indicated that although they know about the harmful effects of smoke, but due to being lazy did not respond quickly. Communicable diseases are still the most important health problem in Pakistan and tobacco smoking is well known risk factor for tuberculosis as found in one study in China. (183)

The results after improvement of hospital service system were not much encouraging in the sense that a TB patient must have sufficient knowledge on the harmful effects of smoking itself and staying in a smoky place. Smoke and tuberculosis has a strong relation as smoke increases the risk for having tuberculosis. The results of one study (184) were similar to this study that due to causal association of tuberculosis and smoking it is important for the physicians to advice their patients to stop smoking, avoid exposure to other's tobacco smoke, and working on a smoky environment. The chances of relapse and mortality with tuberculosis are increased due to its direct relationship with smoking and smoke. Similar conclusion was made in one study in China (185) that due to much evidence of having causal association of tuberculosis with smoke, it was advisable to the doctors and staff to provide proper counseling and assistance to the TB patients on this issue.

Living in a cross ventilated room: Living in a cross ventilated room is the principle infection control measure among the patients who may be dispersing mycobacterium tuberculosis. The results showed that 21.2% respondents regularly live in a cross ventilated room as compared to 24.5% after improvement. It was not a significant improvement after the successful implementation of hospital service system. The reason explained by majority of the patients that they live in old built houses and the modern style of cross ventilation were not included in the designs. Due

to economic constraint they are forced to live here because of no other alternative. But they were motivated to go to the public park daily for breathing in fresh air. There were strong evidences that the spread of TB to other persons is reduced while living in a cross ventilated room. For the same reason it was argued in one study (186) that cross ventilated rooms are necessary not only for living but waiting rooms for TB patients and doctor's office and staff rooms must be cross ventilated.

Composition of meals: Nutritious food contributes towards a good heath in way that they can increase the body resistance against infections. In this study more than one third of the patients (39.4%) had the practice to taking meals with meat, vegetables, rice and fruit oftenly that was further increased to 53.1% after improvement of services system. Some of the patients commented that although they know that during disease nutritious food gives more benefits but financial constraints do not allow them for this. It was result of education by the healthcare staff that patients realized and improved their quality of food. Similar recommendations were given in one study in order to fight TB malnutrition is required to be addressed. (187) In another study in Ghana (147) it was suggested that one of the important sign of TB was loss of appetite combined with hard working leads to under or malnutrition. So a balanced diet helps to improve the situation.

5.4.2 Comparison of treatment adherence before and after improvement of hospital service system by items

Table 22 summarized the results indicated that overall treatment adherence was statistically significant at $p < .001$. It can be concluded that treatment adherence after implementation of hospital service system was better. Means score for individual items were discussed as below:

Taking anti-TB drugs: The results showed that the differences before and after improvement were statistically significant at $p = 0.001$. It was discussed earlier that taking full course of TB treatment not only cured but spread of disease was also controlled. Social support to the TB patients especially during the intensive phase of

treatment is very important because not only the dose missing pattern starts from this phase when symptoms disappeared but development of drug resistance is also associated with this phase. It is evident that community visit program of the healthcare team was well involved to ensure social support of TB patients from the community. There are studies with the same conclusion like one in Ethiopia (188) and another in Australia (189) for the provision of social support and intake of drugs regularly.

Composition of meals: It was found that composition of meals was statistically significant at $p < .001$ before and after improvement. TB is a disease of poor because among other factors malnutrition is also a contributing factor because it lowers the body resistance towards the infections. Similar results were found in a study on malnutrition and gender. (190) It was found that both male and female TB patients were significantly malnourished therefore recommended that patients receive nutritional support during their treatment, in order to overcome the nutritional deficiencies

Breathing exercise: The results revealed that breathing exercise was statistically significant at $p < .001$ before and after improvement. Breathing exercise increase the air flow in the lungs and thus exchange of oxygen and carbon di oxide is improved.

Leaving the room in case a person starts smoking: According to the results “leaving the room if a person started smoking there” was statistically significant at $p = .012$ before and after improvement. It is advisable for the TB patients not only to avoid smoking but avoid passive smoking also because tobacco smoking has a positive influence in the development of TB. It was found in one study (191) that among all the TB patients participated in the research, the smokers were more than non-smokers Use of tobacco promotes the non-compliance behavior of TB patients. In countries where there is high incidence of TB are facing double burden of disease because of increased tobacco use and smoking related diseases. In another (192) study it was argued that if TB patients follow the appointments and visit the TB

clinic regularly during the treatment, the self care advice influence their smoking related behavior.

Avoid working in smoky place: The results showed that avoid working in smoky place was statistically difference at p = .032 before and after improvement. Working in a smoky place has almost the same effect on TB patients as with the smoking or living with persons who smoke regularly. As concluded in two studies (186, 187) that working in a smoky place and TB has causal association. It is the responsibility of the physician to advice the TB patients not expose themselves to the smoke because of chances of reoccurrence and complications of like COPD are increased Among many other risk factors working in a smoky place is also a predisposing factor for TB. In a study carried out in China (193) thus concluded that exposure to poor environment and working at a place with chemical fumes were the risk factors.

Collection of sputum in a covered box: as indicated in the results that collection of sputum in a covered box was statistically significant at p < .001 before and after improvement. Sputum collection for microscopy needs some advice and guidance from the laboratory staff because it influence on the results and if the quality of sputum and its collection process was not correct less cases of sputum positive were recorded. In one study (194) it was recommended that sputum collection may be carried out by health workers because it improved the smear positive case detection and treatment success rate also. This service could be provided in accessibility to services were very good. In another study (195) similar conclusions were made as using proper techniques for collection of sputum not only improve case detection rate but it was also considered that good techniques had considerable affect on the transmission of TB. Because the appropriate number of sputum smears positive results will provide the opportunity to treat and follow up these patients promptly and properly thus there was a decrease in TB transmission.

Avoid staying at crowded place: The results show that avoidance to stay in a crowded place was statistically significant at p < .001.

Consultation with doctor: The results show that consultation with doctor was statistically significant at p-value < .001 before and after improvement. Role of the doctor as a primary healthcare physician is very important because it has multidimensional responsibilities for the management of TB. Early diagnosis and prescribing effective treatment with correct regimen increases the treatment success rate but minimizes the morbidity and mortality due to TB. There are many social and cultural barriers that prevent the TB patient to consult the doctor at the onset of symptoms. It was in many communities that traditional treatment is effective than the modern treatment but at certain places reverse thinking was also seen. Inability to consult the doctor is mostly due to stigma and societal beliefs. It was concluded in one study (196) that doctor's role is to provide education in the context of local perceptions of the TB. The patients who consulted with the medical doctor at the early onset of disease have excellent treatment success rates.

Living in a cross ventilated room: according to the results this item was not statistically difference at p = .058 before and after improvement. Cross ventilate room prevent the transmission of TB to other persons. Patients might have some limitations according to their shelter which could not be made better as most of them (87.9%) were unemployed and labor. It was strongly argued in one study (186) for advising cross ventilated rooms for the care of all patients with tuberculosis, because these measures minimize transmission the disease to the healthy persons including healthcare staff.

Follow up visits: It was found that follow up visit by the patients was not statistically difference at p = .158 before and after improvement. It is possible that the cost of transportation may not be affordable for them as almost half of them (47.5%) had no or low income.

5.5 Limitations of the study

1. During the research process National Immunization Days (NID) campaign occurred two times. It was compulsory for everybody who was employed

by Health Department Government of the Punjab, to do the assigned duties as per schedule. It affected the routine for the treatment of TB patients.

2. The problems of communication between doctor and some TB patients occurred in order to manage the patients coming from North Western Frontier Province (NWFP). They have entirely different language named “Pushto” and doctors in TB clinic do understand that language. In order to deal with that problem researcher arranged an interpreter from another department of hospital. Even there was interpreter available but it was not able to translate and explain in the same way as the doctor himself with the same language.

3. During the early stages of the study, most of the staff, doctor and even the hospital administration felt that their activities were observed. It made them extra-ordinary conscious and alert. All those used to show their working actively and according to the set schedule. It affected the normal assessment of service quality at the very beginning.

4. The study was a non-randomized and there was no control group which was unavoidable according to the ethical issues.

CHAPTER VI
CONCLUSION AND RECOMMENDATIONS

The purpose of this study was to improve the hospital service system in order to increase treatment adherence among TB patients. It was a quasi experimental, one group pretest posttest design conducted at Rawalpindi District Hospital. The 99 respondents were newly diagnosed TB patients who attended TB clinic outpatient department during February and March 2009. Data were collected by using close ended questionnaire for three variables: quality of hospital service system; patient satisfaction; and treatment adherence among TB patients. The improvement in the hospital service system was made by applying the concept of chronic care model for six months and the progress was measured before and after improvement. For descriptive statistics, mean, median, and standard deviation were used whereas for inferential statistics paired t-test was used to compare the means score differences, and significant level was set at $p \leq .05$.

6.1 Conclusion

The results of this study revealed that the overall quality of hospital service system was improved significantly after improvement in the service system. All the dimensions improved significantly but a greater effect was found in accessibility (75.8% vs 19.4%) in terms of friendly behavior of doctor and staff, clear guidance about the available services, and reduction in waiting times before and after respectively; and counseling (98.0% vs 49.0%) in terms of giving individual attention to the patients, providing information on TB, its treatment and side effects of drugs, understanding the patient's needs by the staff, and time spent by the doctor to discuss the fears and solving the disease related problems. Another significant improvement was found in the work of laboratory. It was concluded on the basis of these results that increasing accessibility to the services and proper counseling by doctor expert in

inter-personal communication were important to improve the quality of the hospital service system.

The results of this study indicated that there was improvement in the overall patient satisfaction along with all the dimensions, the significant improvement was indicated before and after improving the service system in tangibles (32.3% vs 0.0%), reliability (26.3% vs 3.1%), and empathy (24.2% vs 1.0%). Based on these results it was concluded that well maintained waiting room, allocated time by the doctor, and information of self care increased patient satisfaction. Patient's satisfaction was also increased due to the expertise of doctor in inter-personal communication.

Treatment adherence was measured by self care practices of TB patients. Before the intervention the overall self care practices needed for improvement as 76.8% which were better after improvement of hospital service system as 43.9%. Significant improvement was observed in taking anti-TB drugs ($p < .001$), collection of sputum in covered boxes ($p < .001$) and consultation of doctor in case they have any health related problem ($p < .001$). Only two individual items of treatment adherence i.e., living in a cross ventilated room and visit to hospital for follow up were not significantly increased ($p > 0.05$). It has been proven that CCM can be applied in case of chronic infectious diseases as well. All the three hypotheses of the study were accepted.

6.2 Recommendations

6.2.1 Recommendations for implementation

1. The results of the study indicated that the adherence among TB patients was increased because the improvement of the hospital service system, therefore it is recommended to the Rawalpindi District Hospital management to take policy measures of continuous quality improvement in hospital service system so that treatment adherence of TB patients may be continuously increased. Also based on the final treatment outcomes of this study, it is recommended to the administration of the

Rawalpindi District Hospital that periodic evaluation and continuous supervision and monitoring towards TB clinic should be carried out so the sustainability in the results could be maintained.

2. The study revealed that if the TB patients are provided with necessary education about tuberculosis and community resources are used to provide social support the treatment adherence was increased. Therefore, it is required that fortnightly community visit program by the healthcare staff must be continued paying more attention to involve the community. Group discussions by hospital staff can be helpful when focused on the dissemination of more recent information on TB and hospital services.

3. It was also found that patient satisfaction was increased by simple measures e.g. providing a separate waiting room, privacy in the examination room, equipment in the examination room and laboratory including interpersonal communication by hospital staff. So the improvement of service facilities in TB clinic should be done urgently as it does not cost much and it can build trust of TB patients.

4. The results indicated that training courses for the doctor and staff are necessary to update their knowledge and provide confidence for the management of TB patient. It is recommended that before deputing new staff in the TB clinic, necessary trainings should be given not only to maintain the situation but bringing about further improvement. Moreover refresher courses for the same staff are also required from time to time.

6.2.2 Recommendations for further study

1. A qualitative study could be applied to explore in detail the root causes of treatment adherence among TB patients.

2. A study on the quality of life of TB patients is recommended to be carried out along with treatment adherence.

REFERENCES

1. Center of Disease Control and Prevention. A Global Perspective on Tuberculosis, CDC, Division of Tuberculosis Elimination, Fact Sheets. http://www.cdc.gov/tb/WorldTBDay/resources_global.htm. 2008. (Last access Nov. 2009)
2. World Health Organization. Tuberculosis facts, Stop TB partnership. 2008. http://www.who.int/tb/publications/2008/factsheet_april08.pdf
3. Corbett EL., Watt CJ., Walker N., Maher D., Williams BG., Raviglione MC. The growing burden of tuberculosis: global trends and interactions with the HIV epidemic. Arch Intern Med 2003 May 12; 163(9):1009-21.
4. Dye C., Scheele S., Dolin P., Pathania V., Raviglione MC. Consensus statement. Global burden of tuberculosis: estimated incidence, prevalence, and mortality by country. WHO Global Surveillance and Monitoring Project. JAMA 1999; 282:677-86.
5. Campbell IA., Bah-Sow O. Pulmonary tuberculosis: diagnosis and treatment. BMJ2006 May 20; 332(7551):1194-7.
6. WHO. Global tuberculosis control: Surveillance, planning, financing: WHO report 2008. 2008.
7. Federal Bureau of Statistics. Gender Statistics in Pakistan, Concluding workshop, Enhancing social and gender statistics, Federal Bureau of Statistics. 2003.
8. Government of Pakistan. Ministry of economic affairs; Economic survey of Pakistan; www.accountancy.com.pk/docs/Economic_Survey 2002-3. (Last access Nov. 2009)
9. Marsh D., Hashim R., Hassany F., Hussain N., Iqbal Z., Irfanullah A. Front-line management of pulmonary tuberculosis: an analysis of tuberculosis and treatment practices in urban Sindh, Pakistan. Tuber Lung Dis 1996 77(1): 86-92.

10. Khan I., Chotani R., Khan S., Laaser U. Enhancing detection or focusing cure? What is the best strategy to prevent TB Drug resistance In Pakistan? The Internet Journal of Infectious Diseases2003; 3(1).
11. World Health Organization. Adherence to long term therapies: Evidence for action. 2003
12. Israr SM. Is Ministry of Health fully prepared to implement an effective DOTS program in Pakistan? An operations research on TB control program in the public health sector in Sindh. J Pak Med Assoc 2003 Aug; 53(8):324-7.
13. Sabaté E. Adherence to long term therapies; Evidence for action. World Health Organization. 2003.
14. Thomas C. A literature review of the problems of delayed presentation for treatment and non-completion of treatment for tuberculosis in less developed countries and ways of addressing these problems using particular implementations of the DOTS strategy. J Manag Med 2000; 16(4-5): 371-400.
15. Shimouchi A. Tuberculosis problems in the Asia-Pacific region. Respirology 2001 Mar; 6(1):75-8.
16. Volmink J., Garner P. Directly observed therapy for treating tuberculosis. Cochrane Database Syst Rev 2001(4): CD003343.
17. Walley JD., Khan MA., Newell JN., Khan MH. Effectiveness of the direct observation component of DOTS for tuberculosis: a randomized controlled trial in Pakistan. Lancet2001 Mar 3; 357(9257): 664-9.
18. Garner P., Smith H., Munro S., Volmink J. Promoting adherence to tuberculosis treatment. Bull World Health Organ2007 May; 85(5): 404-6.
19. WHO. Implementing the Stop TB Strategy: A hand book for national tuberculosis programs. WHO/HTM/TB/2008.401. 2008.
20. WHO. Tuberculosis care; International standards for tuberculosis care: Developed by the Tuberculosis Coalition for Technical Assistance (TBCTA). 2006.
21. Department of Health, Government of UK. Improving Chronic Disease Management. www.dh.gov.uk/en/Publicationsandstatistic/DH_4075214. 2004. (Last access Dec. 2009)

22. Wagner EH., Austin BT., Davis C., Hindmarsh M., Schaefer J., Bonomi A. Improving chronic illness care: translating evidence into action. Health Aff (Millwood) 2001; 20:64-78.
23. Bodenheimer T., Wagner EH., Grumbach K. Improving primary care for patients zwith chronic illness: the chronic care model, Part 2. JAMA 2002 Oct 16; 288(15): 1909-14.
24. Hibbard JH. Engaging health care consumers to improve the quality of care. Med Care 2003 Jan; 41(1 Suppl): I61-70.
25. Campbell SM., Roland MO., Buetow SA. Defining quality of care. Soc Sci Med 2000 Dec; 51(11): 1611-25.
26. WHO. TB/HIV Clinical Manual, 2nd edition. World health Organization, Geneva http://www.who.int/tb/publications/who. 2004. (Last access Feb. 2010)
27. WHO. Global tuberculosis control: epidemiology, strategy, financing: WHO report 2009. 2009.
28. WHO. What is DOTS? A Guide to Understanding the WHO-recommended TB control strategy known as DOTS. WHO/CDS/CPC/TB/99.270. 1999.
29. Enarson DA., Rieder HL., Arnadottir T., Trébucq A. Management of Tuberculosis. A guide for low income countries. International Union Against Tuberculosis and Lung Disease (IUATLD). 2000 (5).
30. WHO. Treatment of tuberculosis. Guidelines for national programs. Third edition. WHO/CDS/TB/2003.313. 2003: 48.
31. CDC. Center of Disease Control and Prevention: Tuberculosis: Learn the signs and symptoms of TB disease. www.cdc.gov/Features/TBsymptoms/. 2008. (Last access Dec. 2009)
32. Rieder HL. Epidemiologic basis of tuberculosis control. International Union against Tuberculosis and Lung Disease (First edition 1999). 1999.
33. CDC. Treatment of tuberculosis, American Thoracic society, CDC and Infectious Diseases Society of America. MMRW, Recommendations and reports 2003; 52(RR11):1-77.
34. WHO Pakistan. TB DOTS guidelines, Pakistan. http://www.whopak.org/disaster. 2005. (Last access Dec. 2009)

35. Harries AD., Dye C. Tuberculosis. Ann Trop Med Parasitol 2006 Jul-Sep; 100(5-6):415-31.

36. Olum Y. Modern management theories and practices. Paper presented at the 15th East African Central Banking Course. . 2004

37. McNamara C. Management help, free management library: Management hub; http://managementhelp.org/mgmnt/defntion.htm. 2007 (Last access Dec. 2009)

38. WHO. The World health report 2000: Health systems; improving performance. 2000:23-4.

39. WHO. Health systems performance assessment. BMC Public Health. WHO presentations at the 4th Annual International Health Economics Association (iHEA) World Congress, San Francisco, June 2003. 2003.

40. Massoud R., Askov K., Reinke J., Franco LM., Bornstein T., Knebel E., MacAulay C. A Modern Paradigm for Improving Healthcare Quality. QA Monograph Series 1(1) Bethesda, MD: Published for the U.S. Agency for International Development (USAID) by the Quality Assurance Project. 2001.

41. McKee M., Healy J. Hospitals in a changing Europe: The significance of hospitals: an introduction. 2002.

42. Douglas JF., Brooks R. The Future Hospital: The progressive case for change. Institute for Public Policy Research. 2007.

43. Akram M., Khan F. Health care services and government spending in Pakistan. Pakistan institute of development economics, Islamabad. 2007: 32.

44. WHO. Measuring hospital performance to improve the quality of care in Europe: A need for clarifying the concepts and defining the main dimensions. Report on a WHO Workshop Barcelona, Spain, 10-11 January 2003. 2003.

45. WHO. What are the best strategies for ensuring quality in hospitals? WHO regional office for Europe's Health Evidence Network (HEN). November 2003. 2003.

46. ISO. Quality systems - model for quality assurance in design, development, production, installation and servicing. Geneva, International Standards Organization, 2000. 2000.
47. Tony AD., Nassimbeni G., Tonchia S. An instrument for quality performance measurement. International journal of production economics1995; 38(2-3): 199-207.
48. University of Twente. Overview communication theories of the UT communication studies; Systems theory; University of Twente; http://www.cw.utwente.nl/theorieenoverzicht/. 2008. (Last access Jan. 2010)
49. Viney LL., Clarke AM., Benjamin YN. A general systems approach to the patient, hospital staff, family, and community: implications for health care services. Behav Sci1986 Oct; 31(4): 239-53.
50. Anaf S., Drummond C., Sheppard L. Combining case study research and systems theory as a heuristic model. . Qual Health Res 2007; 17(10): 1309-15.
51. Nacman M. A systems approach to the provision of social work services in health settings: part 2. Soc Work Health Care 1975 Winter; 1(2): 133-43.
52. Donabedian A. The quality of care. How can it be assessed? JAMA1988; 260(12).
53. Donabedian A. Evaluating the Quality of Medical Care. The Milbank Quarterly 2005; 83(4): 691-729.
54. Goldmann F., Graham EA. The quality of medical care. Provided at the Labor Health Institute, St. Louis, Missouri. St. Louis: The Labor Health Institute. Cited from Avedis Donabedian (2005) Evaluating the Quality of Medical Care. 1954.
55. IOM. Crossing the quality chasm: A new health care system for the 21st century. National Academy Press Washington, DC: Retrieved October 7, 20052001
56. Anderson E. Patient-centeredness: a new approach. Nephrol News Issues 2002 ;12 :80-2.
57. Rose C., Stovall E., Ganz PA., Desch C., Hewitt M. Cancer quality alliance: Blueprint for a better cancer care system. CA Cancer J Clin 2008 Sep-Oct; 58(5): 266-92.

58. Weber RS. Improving the quality of head and neck cancer care. Arch Otolaryngol Head Neck Surg 2007 Dec; 133(12): 1188-92.

59. Pincus HA., Page AE., Druss B., Appelbaum PS., Gottlieb G., England MJ. Can psychiatry cross the quality chasm? Improving the quality of health care for mental and substance use conditions. Am J Psychiatry 2007 May; 164(5): 712-9.

60. Mayberry RM., Nicewander DA., Qin H., Ballard DJ. Improving quality and reducing inequities: a challenge in achieving best care. *Proc (Bayl Univ Med Cent),* 2006; 19(2): 103-18.

61. Garvin DA. Competing on eight dimensions of quality. Haward bussiness review 1987; 65 (1987): 101-09.

62. Parasuraman A., Zeithaml V., Berry L. "SERVQUAL" a multiple-item scale for measuring consumer perceptions of service quality. Journal of re-tailing 611988; 1(1988): 12-40.

63. Oakbrook T. Joint Commision on Accreditation of Health Organizations: Accreditation manual for hospitals, 1996. 1996; II.

64. Evans J., Lindsay W. Management and control of quality, fourth edition. 1999 (1999): 52.

65. Penney C., Henry E. Improving performance management for delivering appropriate care for patients no longer needing acute hospital care. J Health Serv Res Policy 2008 Jan;13 Suppl 1: 30-4.

66. Haddad S., Potvin L., Roberge D., Pineault R., Remondin M. Patient perception of quality following a visit to a doctor in a primary care unit. Fam Pract2000 Feb;17(1):21-9.

67. Aharony L., Strasser S. Patient satisfaction: What we know about and what we still need to explore. Med Care Rev 1993; 50: 49-79

68. Fitzpatrick R. Surveys of patients satisfaction: Important general considerations. BMJ 1991 Apr 13; 302(6781): 887-9.

69. Kitahata MM., Tegger MK., Wagner EH., Holmes KK. Comprehensive health care for people infected with HIV in developing countries. BMJ 2002 Oct 26; 325(7370): 954-7.

70. Setel P., Saker L., Unwin NC., Hemed Y., Whiting D., Kitange H. Is It Time to Reassess the Categorization of Disease Burdens in Low-Income Countries? Am J Public Health2004; 94(3):384-8.

71. Epping-Jordan JE., Pruitt SD., Bengoa R., Wagner EH. Improving the quality of health care for chronic conditions. Qual Saf Health Care 2004 Aug; 13(4): 299-305.

72. Wagner EH., Davis C., Schaefer J., Von Korff M., Austin B. A survey of leading chronic disease management programs: are they consistent with the literature? Manag Care Q1999; 7(3): 56-66.

73. Dorr DA., Wilcox A., Burns L., Brunker CP., Narus SP., Clayton PD. Implementing a multi-disease chronic care model in primary care using people and technology. Dis Manag 2006 Feb; 9(1): 1-15.

74. Wagner EH., Bennett SM., Austin BT., Greene SM., Schaefer JK., Vonkorff M. Finding common ground: patient-centeredness and evidence-based chronic illness care. J Altern Complement Med 2005; Suppl 1:S: 7-15.

75. Wagner E. Chronic disease management: what will it take to improve care for chronic illness? . Eff Clin Pract1998; 1: 2-4.

76. Lonnroth K., Raviglione M. Global epidemiology of tuberculosis: prospects for control. Semin Respir Crit Care Med 2008 Oct; 29(5): 481-91.

77. Hussain A., Mirza Z., Qureshi FA., Hafeez A. Adherence of private practitioners with the National Tuberculosis Treatment Guidelines in Pakistan: a survey report. J Pak Med Assoc 2005 Jan; 55(1): 17-9.

78. Nunn P., Harries A., Godfrey-Faussett P., Gupta R., Maher D., Raviglione M. The research agenda for improving health policy, systems performance, and service delivery for tuberculosis control: a WHO perspective. Bull World Health Organ 2002; 80(6): 471-6.

79. Wagner EH. Change Package, Summery of Wagner Chronic Care Model. McColl Institute, Group Health Cooperative, Seattle 111303.doc.

80. Etkind SC. The role of the public health department in tuberculosis. Med Clin North Am 1993 Nov; 77(6): 1303-14.

81. Maher D. The role of the community in the control of tuberculosis. Tuberculosis (Edinb) 2003; 83(1-3): 177-82.

82. Wagner E. Chronic disease management: what will it take to improve care for chronic illness? Eff Clin Pract1998; 1: 2-4.

83. Wagner EH., Austin BT., Von Korff. Organizing care for patients with chronic illness. Milbank Quarterly1996; 74: 511-44.

84. Loveday M., Thomson L., Chopra M., Ndlela Z. A health systems assessment of the KwaZulu-Natal tuberculosis programme in the context of increasing drug resistance. Int J Tuberc Lung Dis 2008 Sep;12(9): 1042-7.

85. Wagner E. Population-based management of diabetes care. Patient Educ Couns 1995; 26(1-3): 225-30.

86. Khadim MK., Sarfaraz J., Masud TI. Factors affecting tuberculosis control: decision-making at the household level. J Coll Physicians Surg Pak 2003 Dec; 13(12): 697-700.

87. Arcencio RA., Oliveira MF., Cardozo-Gonzales RI., Ruffino-Netto A., Pinto IC., Villa TC. City tuberculosis control coordinators' perspectives of patient adherence to DOT in Sao Paulo State, Brazil,. Int J Tuberc Lung Dis 2008;12(5): 527-31.

88. Barnwell MD., Chitkara R., Lamberta F. Tuberculosis prevention project. J Natl Med Assoc 1992 Dec; 84(12): 1014-8.

89. Fraser HS., Allen C., Bailey C., Douglas G., Shin S., Blaya J. Information systems for patient follow-up and chronic management of HIV and tuberculosis: a life-saving technology in resource-poor areas. J Med Internet Res 2007; 9(4): e29.

90. Tangmankongworakoon T., Chompikul J., Isaranurug SI. Client satisfaction towards the services of Lad Yao Hospital, Lad Yao District, Nakhonsawan Province, Thailand. Journal of Public Health and Development 2007; 5(1).

91. Bowers MR., Kiefe CI. Measuring health care quality: comparing and contrasting the medical and the marketing approaches. Am J Med Qual 2002 Jul-Aug; 17(4): 136-44.

92. Bukstein OG. Satisfaction with treatment for attention-deficit/hyperactivity disorder. Am J Manag Care 2004 Jul; 10(4 Suppl): S107-16.

93. Hashim R. Patient satisfaction with dental services at Ajman University, United Arab Emirates. East Mediterr Health J 2005 Sep-Nov; 11(5-6): 913-21.

94. Linder-Pelz SU. Toward a theory of patient satisfaction. Soc Sci Med 1982; 16(5): 577-82.

95. Pascoe GC. Patient satisfaction in primary health care: a literature review and analysis. Eval Program Plann 1983; 6(3-4): 185-210.

96. Delbanco TL. Quality of care through the patient's eyes. BMJ 1996 Oct 5; 313(7061): 832-3.

97. Kenagy JW., Berwick DM., Shore MF. Service quality in health care. JAMA 1999 Feb 17; 281(7): 661-5.

98. Rubin HR. Can patients evaluate the quality of hospital care? Med Care Rev 1990 Fall; 47(3): 267-326.

99. McCusker J. Development of scales to measure satisfaction and preferences regarding long-term and terminal care. Med Care 1984 May; 22(5): 476-93.

100. Inui TS., Carter WB. Problems and prospects for health services research on provider-patient communication. Med Care 1985 May; 23(5): 521-38.

101. Touchette DR., Shapiro NL. Medication compliance, adherence, and persistence: current status of behavioral and educational interventions to improve outcomes. J Manag Care Pharm 2008 Aug; 14(6 Suppl D): 2-10.

102. Rocha M., Pereira S., Barros H. The role of adherence in tuberculosis HIV-positive patients treated in ambulatory regimen Eur Respir J 2003; 21: 785-88.

103. Jakubowiak W., Bogorodskaya E., Borisov S., Danilova I., Kourbatova E. Treatment interruptions and duration associated with default among new patients with tuberculosis in six regions of Russia. Int J Infect Dis 2008 Nov 11.

104. Fallab-Stubi CL., Zellweger JP., Sauty A. Electronic monitoring of adherence to treatment in the preventive chemotherapy of tuberculosis. Int J Tuberc Lung Dis 1998; 2(7): 525–30.

105. Frieden TR., Sbarbaro JA. Promoting adherence to treatment for tuberculosis: the importance of direct observation. World Hosp Health Serv 2007; 43(2): 30-3.

106. Khan MA., Walley JD., Witter SN., Shah SK., Javeed S. Tuberculosis patient adherence to direct observation: results of a social study in Pakistan. Health Policy Plan 2005 Nov; 20(6): 354-65.

107. Mishra P., Hansen EH., Sabroe S., Kafle KK. Adherence is associated with the quality of professional-patient interaction in Directly Observed Treatment Short-course, DOTS. Patient Educ Couns 2006 Oct; 63(1-2): 29-37.

108. Wares DF., Singh S., Acharya AK., Dangi R. Non-adherence to tuberculosis treatment in the eastern Tarai of Nepal. Int J Tuberc Lung Dis 2003 Apr; 7(4): 327-35.

109. Weiner BJ., Alexander JA., Shortell SM., Baker LC., Becker M., Geppert JJ. Quality improvement implementation and hospital performance on quality indicators. Health Serv Res2006 Apr; 41(2):307-34.

110. Ham C. Improving the performance of health services: the role of clinical leadership. Lance t2003 Jun 7; 361(9373): 1978-80.

111. Rothman AA., Wagner EH. Chronic illness management: what is the role of primary care? Ann Intern Med 2003 Feb 4; 138(3): 256-61.

112. Weir N., Dennis MS. Towards a national system for monitoring the quality of hospital-based stroke services. Stroke 2001 Jun; 32(6): 1415-21.

113. Wilson A., Hewitt G., Matthews R., Richards SH., Shepperd S. Development and testing of a questionnaire to measure patient satisfaction with intermediate care. Qual Saf Health Care2006;15:314-9.

114. Hendriks AA., Smets EM., Vrielink MR., Van es SQ., De Haes JC. Is personality a determinant of patient satisfaction with hospital care? Int J Qual Health Care 2006 Apr; 18(2): 152-8.

115. Ofili AN., Ofovwe CE. Patient's assessment of efficiency of services at a teaching hospital in a developing country. Annals of African Medicine 2005; 4(4): 150-3.

116. Hering-C. Lin., Sudha X., Laditka JN. Patient perceptions of service quality in group versus solo practice clinics. International Journal for Quality in Health Care 2004; 16(6): 437-45.

117. Shipley K., Hilborn B., Hansell A., Tyrer J., Tyrer P. Patient satisfaction: a valid index of quality of care in a psychiatric service. Acta Psychiatr Scand 2000 Apr; 101(4): 330-3.

118. Liefooghe R., Suetens C., Meulemans H., Moran MB., De Muynck A. A randomized trial of the impact of counseling on treatment adherence of tuberculosis patients in Sialkot, Pakistan. Int J Tuberc Lung Dis 1999 Dec; 3(12): 1073-80.

119. Lin HC., Xirasagar S., Laditka JN. Patient perceptions of service quality in group versus solo practice clinics. Int J Qual Health Care 2004 Dec; 16(6): 437-45.

120. Jaiswal A., Singh V., Ogden JA., Porter JD., Sharma PP., Sarin R. Adherence to tuberculosis treatment: lessons from the urban setting of Delhi, India. Trop Med Int Health 2003 Jul; 8(7): 625-33.

121. McDonald HP., Garg AX., Haynes RB. Interventions to enhance patient adherence to medication prescriptions: scientific review. JAMA 2002 Dec 11; 288(22): 2868-79.

122. Mishra P., Hansen EH., Sabroe S., Kafle KK. Socio-economic status and adherence to tuberculosis treatment: a case-control study in a district of Nepal. Int J Tuberc Lung Dis 2005 Oct; 9(10): 1134-9.

123. Munro SA., Lewin SA., Smith HJ., Engel ME., Fretheim A., Volmink J. Patient adherence to tuberculosis treatment: a systematic review of qualitative research. PLoS Med 2007 Jul 24; 4(7): e238.

124. Khan A., Walley J., Newell J., Imdad N. Tuberculosis in Pakistan: socio-cultural constraints and opportunities in treatment. Soc Sci Med 2000 Jan; 50(2): 247-54.

125 PTP. TB situation Punjab, Provincial TB Control Program, Punjab. 2008

126. Brooker DJ., Dinshaw CJ. Staff and patient feedback in mental health services for older people. Qual Health Care 1998 Jun; 7(2): 70-6.

127. Angermeier I., Dunford BB., Boss AD., Boss RW. The impact of participative management perceptions on customer service, medical errors, burnout, and turnover intentions. J Healthc Manag 2009 Mar-Apr; 54(2): 127-40; discussion 41.

128. Pozsik CJ. Compliance with tuberculosis therapy. Med Clin North Am 1993 Nov; 77(6): 1289-301.

129. Moran GJ., Fuchs MA., Jarvis WR., Talan DA. Tuberculosis infection-control practices in United States emergency departments. Ann Emerg Med 1995 Sep; 26(3): 283-9.

130. Zachariah R., Teck R., Buhendwa L., Labana S., Chinji C., Humblet P. How can the community contribute in the fight against HIV/AIDS and tuberculosis? An example from a rural district in Malawi. Trans R Soc Trop Med Hyg 2006 Feb; 100 (2): 167-75.

131. Kathryn F. The Chronic Care Model: Description and Application for Practice. Medscape 2007.

132. Atun RA., Samyshkin YA., Drobniewski F., Skuratova NM., Gusarova G., Kuznetsov SI. Barriers to sustainable tuberculosis control in the Russian Federation health system. Bull World Health Organ 2005 Mar; 83(3): 217-23.

133. Gysels M., Higginson IJ. Access to services for patients with chronic obstructive pulmonary disease: the invisibility of breathlessness. J Pain Symptom Manage 2008 Nov; 36(5): 451-60.

134. Rowe KA., Makhubele B., Hargreaves JR., Porter JD., Hausler HP., Pronyk PM. Adherence to TB preventive therapy for HIV-positive patients in rural South Africa: implications for antiretroviral delivery in resource-poor settings? Int J Tuberc Lung Dis 2005 Mar; 9(3): 263-9.

135. Cheng G., Tolhurst R., Li RZ., Meng QY., Tang S. Factors affecting delays in tuberculosis diagnosis in rural China: a case study in four counties in Shandong Province. Trans R Soc Trop Med Hyg 2005 May; 99(5): 355-62.

136. Demissie M., Getahun H., Lindtjorn B. Community tuberculosis care through "TB clubs" in rural North Ethiopia. Soc Sci Med 2003 May; 56(10): 2009-18.

137. Qureshi SA., Morkve O., Mustafa T. Patient and health system delays: health-care seeking behaviour among pulmonary tuberculosis patients in Pakistan. J Pak Med Assoc 2008 Jun; 58(6): 318-21.

138. Anderson RT., Camacho FT., Balkrishnan R. Willing to wait?: the influence of patient wait time on satisfaction with primary care. BMC Health Serv Res2007;7:31.

139. Mattila EA. Patient guidance during the hospitalization--patients' perceptions and experiences. Hoitotiede 1998; 10(3): 144-52.

140. Bajramovic J., Emmerton L., Tett SE. Perceptions around concordance--focus groups and semi-structured interviews conducted with consumers, pharmacists and general practitioners. Health Expect 2004 Sep; 7(3): 221-34.

141. Auer C., Sarol JJr., Tanner M., Weiss M. Health seeking and perceived causes of tuberculosis among patients in Manila, Philippines. Trop Med Int Health 2000 Sep; 5(9): 648-56.

142. Ahmed J., Chadha VK., Singh S., Venkatachalappa B., Kumar P. Utilization of RNTCP services in rural areas of Bellary District, Karnataka, by gender, age and distance from health centre. Indian J Tuberc 2009 Apr; 56(2): 62-8.

143. Creek TL., Lockman S., Kenyon TA., Makhoa M., Chimidza N., Moeti T. Completeness and timeliness of treatment initiation after laboratory diagnosis of tuberculosis in Gaborone, Botswana. Int J Tuberc Lung Dis 2000 Oct; 4(10): 956-61.

144. Dembele SM., Ouedraogo HZ., Combary AI., Sondo B., Macq J., Dujardin B. Are patients who present spontaneously with PTB symptoms to the health services in Burkina Faso well managed? Int J Tuberc Lung Dis 2006 Apr; 10(4): 436-40.

145. Jittimanee SX., Nateniyom S., Kittikraisak W., Burapat C., Akksilp S., Chumpathat N. Social stigma and knowledge of tuberculosis and HIV

among patients with both diseases in Thailand. PLoS One 2009; 4(7): e6360.

146. Lewis CP., Newell JN. Improving tuberculosis care in low income countries - a qualitative study of patients' understanding of "patient support" in Nepal. BMC Public Health 2009; 9:190.

147. Dodor E. Evaluation of nutritional status of new tuberculosis patients at the effia-nkwanta regional hospital. Ghana Med J 2008 Mar; 42(1): 22-8.

148. Xu W., Lu W., Zhou Y., Zhu L., Shen H., Wang J. Adherence to anti-tuberculosis treatment among pulmonary tuberculosis patients: a qualitative and quantitative study. BMC Health Serv Res 2009; 9:169.

149. Driver CR., Matus SP., Bayuga S., Winters AI., Munsiff SS. Factors associated with tuberculosis treatment interruption in New York City. J Public Health Manag Pract 2005 Jul-Aug; 11(4): 361-8.

150. Golub JE., Bur S., Cronin WA., Gange S., Baruch N., Comstock GW. Patient and health care system delays in pulmonary tuberculosis diagnosis in a low-incidence state. Int J Tuberc Lung Dis 2005 Sep; 9(9): 992-8.

151. Widjanarko B., Gompelman M., Dijkers M., van der Werf MJ. Factors that influence treatment adherence of tuberculosis patients living in Java, Indonesia. Patient Prefer Adherence 2009; 3: 231-8.

152. Salhotra VS. Drug procurement and management. J Indian Med Assoc 2003 Mar; 101(3): 175-6.

153. Shinnick TM., Iademarco MF., Ridderhof JC. National plan for reliable tuberculosis laboratory services using a systems approach. Recommendations from CDC and the Association of Public Health Laboratories Task Force on Tuberculosis Laboratory Services. MMWR Recomm Rep 2005 Apr 15; 54(RR-6): 1-12.

154. Al-Hajoj SA., Alrabiah FA. Role of tuberculosis laboratories in Saudi Arabia. A call to implement standardized procedures. Saudi Med J 2004 Nov; 25(11): 1545-8.

155. Ajayi IO., Olumide EA., Oyediran O. Patient satisfaction with the services provided at a general outpatients' clinic, Ibadan, Oyo State, Nigeria. Afr J Med Med Sci 2005 Jun; 34(2): 133-40.

156. Rajaraman D. Patient satisfaction survey – a measure of quality of patient care and clinical governance. J Integr Care Pathw 2009; 13(1): 30-2.

157. El-Awady MY. Satisfaction of clients attending out-patient clinics at Ain Shams University Hospitals. J Egypt Public Health Assoc 1999; 74(3-4): 263-74.

158. Ng CW., Lim GH., McMaster F., Molina J., Seow E., Heng BH. Patient satisfaction in an observation unit: the Consumer Assessment of Health Providers and Systems Hospital Survey. Emerg Med J 2009 Aug; 26(8): 586-9.

159. Yanai H., Schushan-Eisen I., Neuman S., Novis B. Patient satisfaction with endoscopy measurement and assessment. Dig Dis 2008; 26(1): 75-9.

160. Tung YC., Chang GM. Patient satisfaction with and recommendation of a primary care provider: associations of perceived quality and patient education. Int J Qual Health Care 2009 Jun; 21(3): 206-13.

161. Gelaw M., Genebo T., Dejene A., Lemma E., Eyob G. Attitude and social consequences of tuberculosis in Addis Ababa, Ethiopia. East Afr Med J 2001 Jul; 78(7): 382-8.

162. Hoa NP., Thorson AE., Long NH., Diwan VK. Knowledge of tuberculosis and associated health-seeking behaviour among rural Vietnamese adults with a cough for at least three weeks. Scand J Public Health Suppl 2003; 62: 59-65.

163. Kutash M., Northrop L. Family members' experiences of the intensive care unit waiting room. J Adv Nurs 2007 Nov; 60(4): 384-8.

164. Martins N., Grace J., Kelly PM. An ethnographic study of barriers to and enabling factors for tuberculosis treatment adherence in Timor Leste. Int J Tuberc Lung Dis 2008 May; 12(5): 532-7.

165. Wong CY., Law GT. Treating pulmonary TB. Revisiting an old problem. Aust Fam Physician 2001 Aug; 30(8): 763-6.

166. Rajeswari R., Muniyandi M., Balasubramanian R., Narayanan PR. Perceptions of tuberculosis patients about their physical, mental and social well-being: a field report from south India. Soc Sci Med 2005 Apr; 60(8): 1845-53.

167. Schectman JM., Plews-Ogan ML. Physician perception of hospital safety and barriers to incident reporting. Jt Comm J Qual Patient Saf 2006 Jun; 32(6): 337-43.

168. Nicklin W., McVeety JE. Canadian nurses' perceptions of patient safety in hospitals. Can J Nurs Leadersh 2002 Sep-Oct; 15(3): 11-21.

169. Bion J. Patient safety: Needs and initiatives. Indian J Crit Care Med 2008 Apr; 12(2): 62-6.

170. Chimbanrai B., Fungladda W., Kaewkungwal J., Silachamroon U. Treatment-seeking behaviors and improvement in adherence to treatment regimen of tuberculosis patients using intensive triad-model program, Thailand. Southeast Asian J Trop Med Public Health 2008 May; 39(3): 526-41.

171. Magallon Botaya R., Garcia Mata JR., Antonanzas Lombarte A. Users-physicians: in search of new ways of detecting problems of quality. Aten Primaria 1995 Feb 15; 15(2): 73-80.

172. Steyn M., Borcherds R., van der Merwe N. The use of a rating instrument to teach and assess communication skills of health-care workers in a clinic in the Western Cape. Curationis 1999 Jun; 22(2): 32-40.

173. Ouedraogo M., Kouanda S., Boncoungou K., Dembele M., Zoubga ZA., Ouedraogo SM. Treatment seeking behavior of smear-positive tuberculosis patients diagnosed in Burkina Faso. Int J Tuberc Lung Dis 2006 Feb; 10(2): 184-7.

174. O'Day BL., Killeen M., Iezzoni LI. Improving health care experiences of persons who are blind or have low vision: suggestions from focus groups. Am J Med Qual 2004 Sep-Oct; 19(5): 193-200.

175. Sagbakken M., Frich JC., Bjune G. Barriers and enablers in the management of tuberculosis treatment in Addis Ababa, Ethiopia: a qualitative study. BMC Public Health 2008; 8:11.

176. Savicevic AJ. Gaps in tuberculosis knowledge among primary health care physicians in Croatia: epidemiological study. Coll Antropol 2009 Jun; 33(2): 481-6.

177. Okanurak K., Kitayaporn D., Akarasewi P. Factors contributing to treatment success among tuberculosis patients: a prospective cohort study in Bangkok. Int J Tuberc Lung Dis 2008 Oct; 12(10): 1160-5.

178. Kiwuwa MS., Charles K., Harriet MK. Patient and health service delay in pulmonary tuberculosis patients attending a referral hospital: a cross-sectional study. BMC Public Health 2005;5: 122.

179. Singh MM., Bano T., Pagare D., Sharma N., Devi R., Mehra M. Knowledge and attitude towards tuberculosis in a slum community of Delhi. J Commun Dis 2002 Sep; 34(3): 203-14.

180. Naveen KV., Shirley T. Randomized trial of yoga as a complementary therapy for pulmonary tuberculosis. Wiley InterScience 2004; 4(1): 96-101.

181. Hu DY., Wang T., Liu XY., Chen J., Wang Y., Zeng W. Study on the risk factors leading to irregularly anti-pulmonary tuberculosis drug taking in patients with smear positive. Zhonghua Liu Xing Bing Xue Za Zhi 2007 Mar; 28(3): 237-40.

182. Lange DM. Guidelines for Sputum Collection for TB patients in laboratories; http://www.kcprofessional.com/za/healthcare/resources/specialist-articles/sputum-collection-guidelines.pdf. (Last access Dec. 2009)

183. Wang J., Shen H. Review of cigarette smoking and tuberculosis in China: intervention is needed for smoking cessation among tuberculosis patients. BMC Public Health 2009; 9: 292.

184. Slama K., Chiang CY., Enarson DA., Hassmiller K., Fanning A., Gupta P. Tobacco and tuberculosis: a qualitative systematic review and meta-analysis. Int J Tuberc Lung Dis 2007 Oct; 11(10): 1049-61.

185. Chiang CY., Slama K., Enarson DA. Associations between tobacco and tuberculosis. Int J Tuberc Lung Dis 2007 Mar; 11(3): 258-62.

186. Humphreys H. Control and prevention of healthcare-associated tuberculosis: the role of respiratory isolation and personal respiratory protection. J Hosp Infect 2007 May; 66(1): 1-5.

187. Pakasi TA., Karyadi E., Dolmans WM., van der Meer JW., van der Velden K. Malnutrition and socio-demographic factors associated with pulmonary

tuberculosis in Timor and Rote Islands, Indonesia. Int J Tuberc Lung Dis 2009 Jun; 13(6): 755-9.

188. Mesfin MM., Newell JN., Walley JD., Gessessew A., Tesfaye T., Lemma F. Quality of tuberculosis care and its association with patient adherence to treatment in eight Ethiopian districts. Health Policy Plan 2009 Nov; 24(6): 457-66.
189. Carnie J., Randall M., Ng MM. Tuberculosis. The old and the new. Aust Fam Physician 1998 Jul; 27(7): 615-8.
190. Metcalfe N. A study of tuberculosis, malnutrition and gender in Sri Lanka. Trans R Soc Trop Med Hyg 2005 Feb; 99(2): 115-9.
191. Trifunovic VS., Gvozdenovic BS., Jovanovic D., Vucinic V., Djuric D., Zunic M. Association between tobacco smoking and pulmonary tuberculosis. Vojnosanit Pregl 2009 Oct; 66(10): 797-801.
192. Siddiqi K., Lee AC. An integrated approach to treat tobacco addiction in countries with high tuberculosis incidence. Trop Med Int Health 2009 Apr; 14(4): 420-8.
193. Dong B., Ge N., Liu G. Social economical status, behaviors and environment as the risk factors of tuberculosis in Chengdu China. Zhonghua Liu Xing Bing Xue Za Zhi 2001 Apr; 22(2): 102-4.
194. Datiko DG., Lindtjorn B. Health extension workers improve tuberculosis case detection and treatment success in southern Ethiopia: a community randomized trial. PLoS One 2009; 4(5): e5443.
195. Christie JD., Callihan DR. The laboratory diagnosis of mycobacterial diseases. Challenges and common sense. Clin Lab Med 1995 Jun; 15(2): 279-306.
196. Liefooghe R., Baliddawa JB., Kipruto EM., Vermeire C., De Munynck AO. From their own perspective. A Kenyan community's perception of tuberculosis. Trop Med Int Health 1997 Aug; 2(8): 809-21.
197. National TB Control Program, Ministry of Health, Pakistan. Refresher Module for Doctors, www.ntp.gov.pk. 2008. (Last access Feb. 2009)

APPENDICES

APPENDIX A

Part I

General Characteristics of TB patients

ID Number:……

Please mark (√) in □ or fill in the blank as appropriate.

1. Age (Years)

   □ 1. 15 - 24 □ 2. 25 - 34

   □ 3. 35 - 44 □ 4. 45 – 54

   □ 5. ≥ 55

2. Gender

   □ 1. Male □ 2. Female

3. Religion

   □ 1. Muslim □ 2. Christian □ 3. Buddhist

   □ 4. Hindu □ 5. Others (specify) ……..

4. Marital status

   □ 1. Married □ 2. Single □ 3. Widow

5. Education

   □ 1. No education □ 2. Primary school □ 3. Secondary school

   □ 4. University

6. Occupation

   □ 1. Unemployed □ 2. Laborer □ 3. Govt. Employee

   □ 4. Farmer

□ 5. Government / Non- Government officer

7. Monthly income (Rupees)

□ 1. No income

□ 2. < 5000

□ 3. 5001 - 10000

□ 4. > 10000

Part II

Hospital service system

Instruction: Please mark (X) in one suitable answer

Item	Yes, Always	Yes, Sometimes	No, Never
Accessibility			
1) This hospital is easy to access in term of its services			
2) Hospital staff welcomes you with a friendly manner.			
3) Doctor attends to you in a friendly manner.			
4) The service hours are convenient to you			
5) Hospital has clear direction boards to guide patients where to receive the service.			
6) The hospital provides service within short period of time.			
7) The hospital provides information on available services.			
Continuity of care			
8) This hospital provides its services at the time it is announced			
9) Doctor has patient profile in hand.			
10) Doctor has never repeated asking the same questions.			
11) The hospital staff always being the same person.			
12) The hospital staff gives appointments according to the treatment schedule.			
13) You feel that treatment given to you is in progress.			
Counseling			
14) This hospital gives individual attention to the patients (e.g. taking medical history, flexibility to accommodate patient's requirements, and disliking).			
15) This hospital keeps patients informed about TB, its treatment and side effects of drugs.			
16) This hospital staff understands the specific needs of patients.			
17) The hospital staff gives advice to solve your problems.			
18) Doctor spends time with you discussing your fears and concerns about your disease.			
Drug and side effects			
19) Drugs given to you are good quality			
20) You have given necessary information about the side effects of TB drugs.			

Logistics and supplies			
21) There is TB drugs available to you whenever you come to the hospital			
22) Whenever you need to do the test, laboratory is well equipped.			
23) Whenever you have physical examination, the examination room is well equipped.			
24) Laboratory tests are done without any delay			

Part III

Patient satisfaction

How are you satisfied with the following items?

Instruction: Please mark (X) in one suitable answer

Item	**Very Satisfied**	**Satisfied**	**Un-certain**	**Dis-satisfied**	**Very Dis-satisfied**
Tangibles					
1) Cleanliness of the TB Clinic					
2) Maintenance of the waiting room.					
3) Readiness of the equipments in the examination room.					
4) Instructions given in the hospital.					
5) Information on TB treatment.					
6) Information on self-care.					
Reliability					
7). Method of doctor's physical examination for diagnosis					
8) Doctor’s expertise.					
9) Nurse’s skill in providing care.					
10) Facilities in providing care.					
11) Safety in hospital.					
Responsiveness					
12) Punctuality of doctor.					
13) Information on TB and its treatment.					
14) Availability of staff in providing service.					
15) Concern of hospital staff on your health problem.					
Assurance					
16) Understanding of hospital staff on your feelings.					
17) Courtesy of hospital staff.					
18) Doctor’s confirmation of the treatment’s result.					
Empathy					
19) Privacy in the examination room.					
20) Allocated time of doctor to your health problem as needed.					

Part IV

Treatment adherence of TB patients

Treatment adherence

Instruction: Please mark (X) in one suitable answer

Statement	Regularly	Often	Sometimes	Never
Treatment adherence				
1) You take anti-TB drugs.				
2) You live in a cross ventilated room.				
3) You visit to hospital for follow up treatment.				
4) Your meals are composed of meat, vegetable, rice and fruits.				
5) You do breathing exercise to make my lung function well.				
6) You leave the room if a person starts smoking there.				
7) You avoid working in a smoky place.				
8) You collect sputum in a small box with cover.				
9) You avoid staying in a crowded place.				
10) You consult with the doctor if you have any health problem e.g side effects.				

APPENDIX B

Approval from Ethics Review Committee, Mahidol University

COA. No. MU-IRB 2009/035.3103

Documentary Proof of Mahidol University Institutional Review Board

Title of Project: Improvement of Hospital Service System to Increase Treatment adherence among TB patients at Rawalpindi District Hospital.
(Thesis for Ph.D.)

Principle Investigator: Dr. Muhammad Shafiq Khan

Name of Institution: Faculty of Public Health

Approval includes: 1) MU-IRB Submission form version received date 23 March 2009
2) Participant Information sheet for TB patient version date23 March 2009
3) Participant Information sheet for The Hospital staff at the TB clinic version date 23 March 2009
4) Informed Consent form version date 23 March 2009
5) Questionnaire version received date 29 January 2009

Mahidol University Institutional Review Board is in full compliance with International Guidelines for Human Research Protection such as Declaration of Helsinki, The Belmont Report, CIOMS Guidelines and the International Conference on Harmonization in Good Clinical Practice (ICH-GCP)

Date of Approval: 31 March 2009

Date of Expiration: 30 March 2010

Signature of Chairman: .....
(Professor Shusee Visalyaputra)

Signature of Head of the Institute: .....
(Associate Professor Sansanee Chaiyaroj)
Vice President for Research and Academic Affairs

Office of the President, Mahidol University, 999 Phuttamonthon 4 Rd., Salaya, Phuttamonthon District, Nakhon Pathom 73170. Tel. (662) 8496223-5 Fax. (662) 8496223

APPENDIX C

Approval from Principle Rawalpindi Medical College and Allied Hospitals

Prof. Mohammad Mussadiq Khan
M.B.B.S, DIPLOMAT AMERICAN BOARD OF SURGERY
FCPS (PAK) FACS, FSCS (USA)

PRINCIPAL
RAWALPINDI MEDICAL COLLEGE
AND ALLIED HOSPITALS RAWALPINDI

No: Principal/RMC/2009/30-34 Date: 10-1-09

The Medical Superintendent

- Holy Family Hospital, Rawalpindi
- District Headquarters Hospital, Rawalpindi

Subject: **DATA COLLECTION FOR RESEARCH PROJECT ENTITLED "IMPROVEMENT OF HOSPITAL SERVICE SYSTEM IN ORDER TO INCREASE TREATMENT ADHERENCE AMONG TB PATIENTS"**

Reference application with subject cited above dated: 2nd January 2009 by Dr. Muhammad Shafiq Khan, PhD/Dr.PH Student (Researcher), Faculty of Public Health Mahidol University, Bangkok, Thailand

The request for research / data collection is hereby granted. You are required to extend your full cooperation with Dr. M. Shafiq Khan who wishes to complete his research project

Prof. Mohammad Mussadiq Khan
Principal
RMC & Allied Hospitals
Rawalpindi, Pakistan

Copy forwarded to:

1. The Dean, Faculty of Graduate Studies, Mahidol University, Bangkok, Thailand
2. Associate Professor Dr.(Mrs) Nawarat Suwannapong (Major Advisor), Faculty of Public Health, Mahidol University, Rajvithee Road, Rachathewee, Bangkok, Thailand
3. Dr. Muhammad Shafiq Khan, Dr.PH Student, Faculty of Public Health, Mahidol University, Bangkok, Thailand
4. Dr. Faiza, Institute of Psychiatry, Research Cell, RMC
5. Master File

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APPENDIX D

Training on TB DOTS program

TB DOTS Program	Training
1. Identifying of a suspect	- A patient with persistent cough for three weeks or more. - A patient with a cough less than three weeks or of uncertain duration, are also TB suspects if they have symptoms like blood stained sputum, fever usually at night, weight loss, history of previous TB. - TB can co-exist with other conditions like asthma, COPD, and HIV may develop TB in addition to their chronic illness.
2. Diagnosing a TB patient	- Sputum examination; three samples (spot1, early morning and spot 2).
3. Treatment of TB	- Type of TB patient (New case, relapse, transfer in, treatment failure, return after default, and others) - Categories of TB patient (Cat 1, and Cat 2). - Treatment regimens (For Cat 1 and Cat 2).
4. Educating TB patients and managing contacts.	- Doctor and DOTS facilitator shall provide education to the patient. - Managing household contacts.
5. Managing directly observed treatment	- Direct observation is required to all patients taking rifampicin. - Explaining DOT and importance of continued treatment. - Helping the patient to select a treatment supporter. - Request for treatment support.

Training on TB DOTS program (continued)

TB DOTS Program	Training
6. Managing TB with interrupted treatment	- Record of previous treatment - Deciding on how to manage the patient.
7. Declaring treatment outcomes and quality of care	- Treatment outcomes (Cured, treatment completed, died, treatment failure, defaulted, and transfer out). - Declaring treatment outcomes. - Recording the treatment outcome.
8. Managing support and program inputs.	- Drugs, laboratory reagents and supplies, and print material etc. - Ensuring uninterrupted availability of ATT drugs and other material. - Monitoring of program supplies, identification of gaps, and timely corrected action.

Source: Refresher module for doctors, National TB Control Program, Ministry of Health, Government of Pakistan. (197)

APPENDIX E

Training on treatment adherence

Factor	Intervention
Health system related factors	Uninterrupted ready availability of information; flexibility in available treatment; training and management processes that aim to improve the way providers care for patients with tuberculosis; management of disease and treatment in conjunction with the patients; multidisciplinary care; intensive staff supervision; training in monitoring adherence; DOTS strategy
Socio-economic factors	Easy access to hospital services, free of cost supply of medicines and care, provision of effective social support networks, providing transport to treatment setting; peer assistance; mobilization of community-based organizations; optimizing the cooperation between services, community-based organizations, education of illiterate patients
Condition related factors	Education on use of medicines
Therapy related factors	Simplification of regimens

Training on treatment adherence (cont.)

Factor	Intervention
Patient related factors	Behavioral and motivational intervention; self-management of disease and treatment; self-management of side-effects; memory aids and reminders

Source: Adherence to long term therapies; Evidence for action. World Health Organization 2003 (13).

APPENDIX F

Guidelines and process for Informal interview during study

1. Interviews were done in a separate room near TB clinic of District Hospital to ensure confidentiality, and conducted without using a interview schedule
2. The same interpreter and researcher carried out all of the interviews.
3. Interviews were carried out in native language of every patient.
4. Patients were informed about the purpose of the investigation so that the interviewee could feel confident to talk freely.
5. Brief and simple questions were asked.
6. No direct questions were asked rather introducing question and probing questions were asked to get the information e.g can you tell me about method of examination? What happened when you reported at laboratory for sputum analysis? Can you give me more detail about self-care?
7. No recording either audio or video was done as patients did not allowed for it as they fear of production in front of hospital staff.

BIOGRAPHY

NAME	Muhammad Shafiq Khan
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