

ORIGINAL ARTICLE**ASSESSMENT OF QUALITY OF CARE DELIVERED FOR INFECTIOUS PULMONARY TUBERCULOSIS PATIENTS IN JIMMA ZONE, SOUTH WEST ETHIOPIA****Taddese Geremew¹, Challi Jira², Fitsum Girma²****ABSTRACT**

BACK GROUND: *Providing quality of care for infectious pulmonary tuberculosis patients is crucial in prevention and control of the disease. However, little is known about the existing quality of care in such services. The objective of the study was to assess the quality of care delivered for infectious pulmonary tuberculosis patient in Jimma Zone, South West Ethiopia.*

METHODS: *Facility based cross-sectional study was conducted from January- February 2008 in 10 public health facilities in Jimma Zone. Facility audit was carried out to assess structural quality. Twenty providers were interviewed and records of 299 smear positive patients registered for 1 year was reviewed. Data were entered and analyzed using SPSS 11.0 for windows statistical software and findings at 95% CI and p value of 0.05 were reported as statistically significant.*

RESULTS: *The results of the study showed that all the three quality dimensions were graded as poor in all the study health facilities and overall 66.0% of TB patients receive poor quality care. Four variables were identified that significantly predicted treatment success, i.e. conformity to the recommended schedule of sputum smear microscopy, conformity to DOTS drug regimen during both intensive and continuation phase of therapy and quality of registration of patients' medical records.*

CONCLUSION: *This study revealed that most of the problems could be managed at local level, while a few needs further discussion with other management bodies. Success of anti tuberculosis therapy could be ensured through strict adherence to all the elements of DOTS strategy, with special emphasis on the 4 variables that significantly predicted treatment success in the present study.*

KEYWORDS: *Quality, Tuberculosis care, Jimma Zone.*

INTRODUCTION

Mycobacterium Tuberculosis has been present in the human population since antiquity - fragments of the spinal column from Egyptian mummies from 2400 B.C. show definite pathological signs of tubercular decay (1,2). In 1882, the bacterium was seen and identified by the aided human eye for the first time. But the most important breakthrough came in 1944 when streptomycin successfully, and very quickly, cured a critically ill patient (1).

Although a cure for tuberculosis was developed more than 50 years ago, Tuberculosis (TB) still remains one of the world's deadliest infectious diseases. TB kills 5,000 people a day and between 2 and 3 million people each year, 98% of whom live in the developing world (2). In 1993, World Health Organization declared tuberculosis as a global emergency since it causes suffering and death to considerable proportion of the world's population. The global burden of tuberculosis still remains enormous and alarming despite worldwide control efforts (3).

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In response to the global epidemic and due to the prevailing poor level of TB control, a comprehensive framework for effective TB control including the Directly Observed Chemotherapy Short Course (DOTS) strategy was developed by the WHO, with the objective of achieving cure rate of 85% and case detection of 70% by the year 2000 (4).

Ethiopia is one of the top sixteen countries in the world, and one of the top three in Africa, with regard to the number of tuberculosis (TB) patients. Over a third of the population has been exposed to TB. The Annual Risk of TB Infection (ARTI) is 2.2%. An estimated 377,030 Ethiopians (0.62% of the population) have active TB of all kinds, with more than 120,000 new cases in 2003/04, nearly a third of which having smear-positive TB (5).

It was in 1992 that a standardized & well organized TB program, incorporating DOTS, was implemented in a few areas of the country (6) which has reached in 2005 Zonal and Woreda coverage of 100% and 90% respectively (7). Strengthening TB prevention and control through accelerated expansion and improving quality of DOTS is the strategy followed by Federal Ministry of Health and Regional Health Bureaus to control transmission of the infections and subsequently reverse their grave consequences (7).

Therefore, this study was intended to assess the quality of care delivered for infectious pulmonary tuberculosis patients in ten public health facilities in Jimma Zone, Oromiya regional state since only few studies were undertaken in the country.

MATERIALS AND METHODS

This facility based cross-sectional survey was conducted in Jimma Zone from January 30-Feb 30, 2008. The Zonal population was 2.5 million as per the 2007 census. There are two hospitals, 15 Health centers (HCs), 65 health stations and 116 health posts making the zonal health service coverage 56.9%.

Nine randomly selected public health facilities and Jimma University Specialized Hospital were included in the study from the total of 15 public health facilities within the Zone that were engaged in both diagnosis and treatment of tuberculosis patients. From each health facilities one health professional who works at adult OPD were selected randomly by lottery method, while one health professional currently assigned at TB clinic was included to assess the knowledge of the service providers on TB care. Records of all patients with smear positive PTB+ registered starting from

June16, 2005 through June15, 2006(1year Cohorts) were reviewed to assess the performance of the health professional assigned at TB clinic and to evaluate over all quality of TB care.

Operational definition of quality of care, data collection and analysis

Three dimensions of quality of TB care; structure, process and outcome were assessed. The instruments used to assess structure- process- outcome dimension were developed from published literature (8) and modified according to the National TBL guideline and commented by Oromiya Regional Health Bureau TBL experts.

Structural attributes of quality were assessed using a checklist based on five categories: infrastructure; access; management and staffing; drugs and diagnostic testing; and patient environment. An average score for structural quality was computed by assigning a score of 1 for the presence of that aspect or positive responses, a score of 0, for the absence of that aspect or negative responses of each aspect. Maximum attainable score is 26, while minimum is 0. Percentage score for each health facility was calculated and structural quality was classified as; Very good (90-100), Good (80-89), marginal (70-79), Poor (60-69) and Very poor (50- 59).

The process dimension was measured through knowledge assessment of the health professional who was involved in the management of TB patients and performance of the health professional who works at TB clinic. Knowledge of the health professional was assessed by 8 open ended structured questions.

Outcome was evaluated through unit TB register and success rate and defaulter rate of the public health facilities were assessed.

To assess overall quality, composite index was utilized. The composite index used in this study was computed by multiplying 5 parameters using Excel, and includes: quality of registration of the unit TB register; adherence to recommended schedule of sputum smear microscopy according to DOTS strategy; conformity to drug regimen during the intensive and continuation phase and treatment success. The performance of the General Health Worker assigned in TB clinic was assessed by the above index excluding treatment success.

To assess quality of registration, a total of 17 items were audited from the unit TB register: patient name, age, sex, weight, address of patient, TB number, name of contact person, start date of intensive phase, 1-4 sputum smear microscopy, category of treatment, type of TB, drug administered during intensive and continuation phase and treatment outcome.

Quality of registering unit TB register was assessed by assigning a score of 1 for recorded items and 0 for unrecorded items. Maximum attainable score was 17 and minimum score for a record was 0. Percentage score for each record was calculated and quality of medical recording was classified as: very poor (0%–49%), poor (50%–59%), marginal (60%–69%), good (70%–79%), very good (80%–89%) and excellent (90%–100%). Adherence to the recommended schedule of sputum smear microscopy was assessed using the WHO recommended schedule of sputum smear microscopy according to DOTS strategy as a yardstick (10).

An index for smear microscopy compliance was devised comprising 2 elements, number of smears performed and timeliness in performing the smears. Accordingly, a case in which the required number of smears (usually 4) were fulfilled was accorded a score of 1, i.e. a complete score for the first element; however, if ≥ 1 smears were missing, the appropriate fraction was subtracted from the score, if the recommended treatment regimen prescribed 4 smears but only 3 smears were performed, then the score attained for that element was $1.00 - 0.25 = 0.75$. If the treatment regimen prescribed 5 smears, however, and only 4 were performed, this was accorded a score of $1.00 - 0.20 = 0.8$. If the required smears were accomplished on time, a score of 1 was assigned, i.e. a complete score for the second element. If a smear was delayed, its fraction contributing to the overall score was 0 since only a timely smear was assigned a full score.

To attain an overall score (index) for smear microscopy adherence to the recommended schedule, the scores of the 2 elements (for a given case) were multiplied. Quality of smear performance microscopy was classified as: very poor (0–0.5), poor (0.5–0.6), marginal (0.6–0.7), good (0.7–0.8), very good (0.8–0.9) and excellent (0.9–1.0).

Conformity to drug regimen according to DOTS strategy was used as a yardstick (11). Cases were classified as adhering or non-adhering to the recommended drug regimen (type, number and duration); adhering cases were assigned a score of 1 and non-adhering cases a score of 0.

Two health officers and three nurses reviewed the records and perform facility audit.

Ethical clearance obtained from Jimma University ethical research committee. Formal letter was written prior to the study and the results with the recommendations were disseminated to each

service delivery point included in the study. Providers were being asked for their willingness to participate in the study. Confidentiality of the information gathered was assured.

The data were analyzed using SPSS 11.0. Appropriate tables were used to present findings; Odds ratio (OR) and 95% Confidence Interval (CI) and Chi-square test were used to test statistical associations. Multiple logistic regressions were used as appropriate where it was needed.

RESULTS

The study assessed 9 Health centers and one Hospital (Jimma University Specialized Hospital). All the health facilities had at least one functional microscope and 9(90.0%) of the facilities had TB drugs sufficient for at least 3 months. Six (60.0%) of the health facilities had sufficient laboratory reagents and slides for sputum smear microscopy, while copies of Tuberculosis and Leprosy Control Program (TLCP) laboratory manual and TB posters in local language were available in 1(10%) and 2(20.0%) of the health facilities, respectively. Only 5(50.0%) of the Health facilities had a copy of TLCP manual and teaching material (flip charts) on TB.

All the health facilities 10(100.0%) under the study had at least one health professional with special training on DOTS, while 5(50.0%) of them had two. All of them had at least one laboratory technician and in 8(80.0%) of the facilities the laboratory technician had special training on DOTS program

Seven (70.0%) and 6(60.0%) of the health facilities had adequate toilet and sufficient room for the patient load, respectively. Drug storage was found to be in a very good condition in 2(20.0%) of the health facilities while TB drugs were available on weekends in only 1(10%) of the Health facilities.

Five (50.0%) of the health facilities had no waiting area for patients or not sufficient for the patients load, similarly patient privacy was not considered/maintained in these health facilities.

None of the health facilities had separate area for sputum specimen collection. In 6(60.0%) of the health facilities patient complaint/ suggestion mechanism is not practiced.

The overall structural quality was graded very poor in 9 (90.0%) of the health facilities, only Jimma Health Center graded as marginal with the score of 73 % (Table 1).

Table 1. Structural quality score of public health facilities pertaining to TB care, Jimma Zone, April 2008.

Health facility	Drug, Diagnostic testing and other material resources	Management and staffing	Infrastructure and access.	Patient environment.	Average score No. (%)
JUSH	4/9	5/9	2/4	2/4	13/26 (50)
Yebu	5/9	6/9	2/4	1/4	14/26 (54)
Agaro	6/9	7/9	1/4	1/4	15/26 (58)
Asendabo	5/9	6/9	1/4	2/4	14/26 (54)
Sokoru	6/9	6/9	2/4	0/4	14/26 (54)
Serbo	4/9	8/9	2/4	1/4	15/26 (58)
Dedo	6/9	6/9	1/4	2/4	15/26 (58)
JHC	6/9	8/9	2/4	3/4	19/26 (73)
Shebe	4/9	6/9	2/4	2/4	14/26 (54)
LG Health C.	5/9	7/9	1/4	0/4	13/26 (50)

Process quality: A total of 20 health professionals had participated in knowledge assessment of TB care with the response rate of 100.0%. Fourteen (70.0%) professionals were clinical nurses, 2 (10.0%) were BSc nurses 2(10.0%), Health Officers 1(5.0%) Junior clinical nurse and 1(5.0%) health assistants.

The mean service year of professionals was 7.4 years (range 9months to 30 years) and 12(60.0%) of the respondents had special training on tuberculosis DOTS program. The time of training ranged from 7 years back to less than 6 months. The duration of the training was 5 days.

Table 2. Characteristics of patients with smear positive Pulmonary Tuberculosis patients attending public health facilities in Jimma Zone, April 2008.

Characteristics	Total (n= 399) No (%)
Age(Years)	
0<15	14 (3.5)
15-60	371 (93.0)
>60	9 (2.3)
unrecorded	5 (1.3)
Mean (SD)	28.76 (12.4)
Sex	
Male	206 (51.6)
Female	184 (46.1)
Unrecorded	9 (2.3)
Diagnostic category	
New	353 (88.5)
Relapse	17(4.3)
Failure	2 (0.5)
Return after default	2 (0.5)
Transfer	19 (4.8)
Not mentioned	6 (1.5)
Treatment out come	
Cured	202 (50.6)
Treatment completed	74(18.5)
Died	12 (3.0)
Failure	3 (0.8)
Defaulter	27(6.8)
Transfer Out	44 (11.0)
Not Mentioned	37(9.3)
Treatment Success	276 (69.2)

Sixteen (80.0%) and 9(45.0%) of the respondents had very good knowledge about the cardinal symptoms of TB and anti-TB drug categories respectively. Knowledge on minor and major anti-TB drug side effects were found to be poor in majority of the respondents, 18(90.0%) and 17(85.0%) respectively.

A total of 399 (100.0%) records of sputum smear- positive PTB patients were reviewed from unit TB register. The majority of patients, 371(92.9%), were in the age group 15–60 years. Males were little more than half 206(51.6%) of the total patients. Regarding diagnostic category, the highest frequency was for new smear positive pulmonary TB case which accounts for 353(88.5%) followed by relapse 17(4.3%). Failure cases and return after default constitutes 2(0.5%) each, while the rest were transfer cases 19(4.8%) and in 6(1.5%) of cases the category were not mentioned. With respect to treatment outcome, overall 202(50.6%) were cured cases and 74(18.5%) completed treatment; defaulters constituted 27(6.8%) & the treatment success rate,(those cured + treatment completed) was 276(69.2%)(Table 2).

Overall most of the process items were always registered on the TB unit register. However, address of patient and name of contact person were not registered in 92(23.1%) and 70 (17.5%) of cases, respectively.

Over all registration of sputum smear microscopy declined from the 1st smear 399(100.0%) to 213(53.3%) for the 4th smear.

Quality of registration was evaluated as very good overall. It was graded as very good in 5(50%) of the health facilities and good in two health facilities.

With regard to smear microscopy performance, the proper number of smears was performed in 153(38.3%) of cases. Over all 3 smears were omitted in 80(20.1%) of the cases (Table 3).

In general quality of smear microscopy were graded as poor in 4(40.0%) of the health facilities and the rest 2(20.0%) each as good, marginal and very good. Most of the smears were performed on time.

Table 3. Compliance with performing required smear microscopy according to DOTS strategy at Public health facilities in Jimma Zone, April 2008.

Smear microscopy	Total (n= 399) No.(%)
Number of smears done	
proper number	153 (38.3)
1 smear omitted	85 (21.3)
2 smear omitted	69 (17.3)
3 smear omitted	80 (20.1)
4 smear omitted	0 (0)
not applicable((death)	12 (3.0)
Timeliness of smears	
On time	384 (96.2)
2 months late	2 (0.8)
3 months late	0 (0)
4 months late	0 (0)
not applicable((death)	12 (3.0)
	Mean score(SD)
Quality of smear microscopy	
No. of smears	0.7 (0.29)
Timeliness of smear	0.97 (0.17)
Over all quality	0.67 (0.31)
Grading	Marginal

Table 4. Quality of anti-Tuberculosis drug therapy according to DOTS strategy at public health facilities in Jimma Zone, April 2008

Drug regimen	Initial phase of therapy	Continuation phase of therapy
	Total (n= 399) No. (%)	Total (n= 399) No. (%)
Type & No. of prescribed drugs conforming to DOTS	331 (83.0)	247 (61.9)
Duration of therapy complete	315 (78.9)	258 (64.7)
Regimen conforming to DOTS	276 (69.2)	187 (46.9)
Mean Number of drugs per patient (SD)	2.96 (0.65)	2.42 (1.42)

Out come: Overall, the proportion of smear positive patients successfully completing the minimum of 8 months of treatment was 276(69.2%) ranged from 10(33.3%) to 24(82.7%)(table 4). The treatment defaulter rate was 10.0% and above in 3(30.0%) of the health facilities. No defaulter was recorded in 2(20.0%) of the health facilities under the study.

Overall quality: Quality of care was graded as poor in 7(70.0%) of the health facilities. Over all 263(66.0%) of cases received poor quality care, which ranges from 29(97%) at Shebe Health Center to 27(45%) at Jimma Health Center (table 6)

Table 5. Performance of General Health Worker in TB care in Public Health facilities, Jimma Zone, April, 2008.

Health F	Quality of record registration	Drug Regimen conforming to DOTS IP	Drug Regimen conforming to DOTS CP	Sputum smear microscopy adherence	Overall score
JUSH	0.79	0.61	0.35	0.64	0.22
Yebu	0.82	0.65	0.52	0.52	0.32
Agaro	0.93	0.83	0.64	0.76	0.51
Asendabo	0.88	0.60	0.43	0.63	0.24
Sokoru	0.85	0.69	0.50	0.59	0.48
Serbo	0.88	0.71	0.43	0.57	0.29
Dedo	0.94	0.79	0.52	0.84	0.50
JHC	0.97	0.85	0.63	0.88	0.58
Shebe	0.76	0.33	0.13	0.34	0.09
LG Health C.	0.86	0.62	0.33	0.58	0.16
Total	0.88	0.69	0.47	0.67	0.42

Performance of GHW overall score = 0-< 0.5(poor); 0.5- < 0.9 (good); 0.9- 1 (excellent)

Treatment success was significantly correlated to the indices of conformity to the smear microscopy schedule and quality of registration of medical records while patient's age is not associated ($r = - 0.067$, **Pearson** correlation coefficient). Treatment success was statistically significantly correlated ($P < 0.001$) with conformity to drug regimen during both the initial and continuation

phase of therapy and the sex of the patient (Table 7).

Logistic regression analysis was performed to see the predictor of treatment success (dependent variable) for those explanatory variables that are associated with treatment success in the bivariate analysis. Conformity to DOTS drug regimen during the intensive and continuation phase of therapy,

conformity to recommended schedule of sputum smear microscopy and quality of registration of patients' medical records, were the 4 variables that significantly predicted treatment success (Table 8).

Table 6. Overall quality of TB care in Public health facilities, Jimma Zone, April 2008

Name of health facility	Over all quality product	Quality score	Grade
JUSH	16.4/75	0.22	Poor
Yebu	6.7/23	0.29	Poor
Agaro	40.7/80	0.51	Good
Asendabo	5.6/30	0.19	Poor
Sokoru	6.7/16	0.42	Poor
Serbo	4.1/14	0.29	Poor
Dedo	14.5/29	0.50	Good
JHC	33.1/60	0.55	Good
Shebe	0.9/30	0.03	Poor
LG Health C.	5.7/42	0.14	Poor
Total	135.5/399	0.34	Poor

Quality score Grading: poor (0-<5); good (0.5-0.9) and excellent (0.9-1).

DISCUSSION

This study assessed quality of TB care in Jimma Zone, South western Ethiopia, will help programme coordinators, service providers and all those concerned to improve quality of care delivered to TB patients so as to reduce the toll of the disease in the country. The study also serves as a base line for other studies and used as a bench mark for continuous quality improvement processes in the Zone in particular and in the country in general.

Since the study used record review, difficulties in accessing the records and illegibility of the records were the major limitations of this study.

The study identified major constraints in delivering quality of TB care in the study area. Multiple quality problems were identified in all components (structural, process and out come) of tuberculosis care.

Structural quality: The main deficiencies observed from the drug and diagnostic component of structural quality of TB care were, shortage of laboratory reagents, slides for sputum smear microscopy, flip charts and TB posters in local language, in which the score ranged from 44% to 66% among the health facilities. Study in South Africa the public health site showed higher score in this respect (75% and 81%) due to availability of a copy of the NTP guidelines, essential TB drugs, and diagnostic tests in the facility.

In management and staffing component, the absence of quality control procedure, active defaulter tracing mechanisms and absence of health education for TB patients were the major problems identified with score that range from 55% to 88%. In the above study, South Africa the public health center scored far lower than this study which was 26%, due to absence of sputum smear quality control procedure and active defaulter tracing mechanism.

Table 7. Results of association of Tuberculosis treatment success and some explanatory variables at Jimma Zone public health facilities, April 2008

Variables	Successful No. (%)	Un successful No. (%)	Total No. (%)
Sex			
Male	131 (63.6)	75 (36.4)	206(100)
Female	138 (75.0)	46 (25.0)	184 (100)
Significance	Chi- squared test p= 0.023		
Conformity to drug regimen initial phase			
Conforming	212 (76.8)	64 (23.2)	276 (100)
Non conforming	63 (51.2)	60 (48.8)	123 (100)
Significance	Chi- squared test p < 0.001		
Conformity to drug regimen continuation phase			
Conforming	176 (94.1)	11 (5.9)	187 (100)
Non conforming	99 (46.6)	113 (53.4)	212 (100)
Significance	Chi- squared test p < 0.001		

Table 8. Results of logistic regression analysis (Back ward steep wise) with treatment success and five variables found to be significantly associated in bivariate analysis at Jimma Zone public health facilities, April 2008.

Variables		p- value	Exp(B)	95 % CI
Initial model				
1	-0.780	0.045	0.46	0.21-0.98
2	1.95	< 0.001	7.05	3.15-15.79
3	4.07	< 0.001	58.81	9.99- 346.07
4	0.358	0.009	1.43	1.09- 1.87
5	0.136	0.659	1.15	0.63- 2.09
constant	-5.712	< 0.001	0.003	
Final model				
1	-0.785	0.043	0.46	0.21-0.98
2	1.98	< 0.001	7.14	3.20-15.96
3	4.06	< 0.001	58.16	9.97- 339.38
4	0.362	0.008	1.44	1.09- 1.88
constant	-5.545	< 0.001	0.004	

Significant at p- value < 0.05

Variable 1 Conformity to drug regimen initial phase

Variable 2 Conformity to drug regimen continuation phase

Variable 3 Conformity to recommended schedule of sputum smear microscopy

Variable 4 Quality of registration of patient's medical records

Variable 5 Sex of the patient's

CI Confidence Interval

Infrastructure and access were found to be poor as TB drugs was available on weekends in only one of the health facilities. The over all score ranges from 25% to 50%.

In the above study, South Africa similar lower score was reported 60% and 64% due to absence of TB drugs on weekends and size of the building in relation to patient load. With regard to patient environment, there was a large gap among the health facilities, which ranged from 0 to 75%. In 5(50%) of the health facilities there were no waiting area for patients or not sufficient for the patient load, privacy was not maintained or considered and no health facility had separate area for sputum specimen collection. The above study in South Africa reported far better score in this category in public health facilities, which is (67% and 82%).

To make comparison, no previous studies on this area was available, some studies on quality of Family planning services shows similar findings of poor structural condition which is common in developing countries. Some of the most important structural problems like absence of active defaulter tracing mechanism and absence of quality control for sputum smear were a major quality problem given the burden of the disease in the community as a whole, since smear positive patients are the source of Mycobacterium Tuberculosis infection.

Process quality: As to knowledge of the service providers, even though 80% of the respondents had very good knowledge on the cardinal symptoms of TB and 45% of them on anti-TB treatment categories, knowledge on important aspect of patient management was lacking like, knowledge on the side effects of anti TB drugs and the management of this side effects and knowledge on the pertinent information that ought to be given to patients during diagnosis and receiving DOTS. Similar finding was reported from Uganda in that only 6% of the staff knew all the treatment categories while 53% of the staff did not know the treatment categories. Similarly 24% of the staff adequately knew the case description of a TB suspect; 47% were not specific & 29% did not know which is low than this study finding (12).

In review of unit register, little more than half of the patients were men and over 90 % of them were in the economically productive age group (15-60 years). This finding was supported in other studies where in most of the world, more men were diagnosed with and die from TB (13) and about 75% of TB patients in developing countries are in the economically productive age group (14).

Most of the process items were always registered. However address of patients and name of contact person were not registered in 23% and 18% of cases which is very important to trace defaulters or trace them earlier so that they could continue their treatment before defaulting.

Overall quality of performance of smear microscopy was graded as marginal with mean score of 0.67 for all cases. The proper number of smear was performed in only 38.3% of the cases. Over all 3 smear microscopy were omitted in 20% of the cases this shows that those cases were not monitored through out the course of treatment. Timeliness of smear microscopy were observed to be better, mean score 0.97. This finding is consistent with the study undertaken in Egypt where the proper number of smear was performed in 39% of the cases in two health facilities in Alexandria from the total of 249 cases (9). The mean timeliness of smear is 0.92 in the same study (9).

This study showed that treatment regimen conformed in 64.7 % of cases during the initial phase of therapy and only 46.9% during the continuation phase. Conformity may be related to type and number of prescribed drugs or duration of treatment course. In the above mentioned study in Alexandria, Egypt, treatment regimen conformed in 74.7% and 87.5% during the initial and continuation phase respectively (9) which was far better from our finding and this could be due to better management of case by those health facilities.

Out come quality: Over all, only 276(69.1%) smear positive patients successfully completed (success rate) the treatment regimen and about half 202 (50.6%) were cured cases which is far below the National and International target of $\geq 85\%$. Similar finding was reported in a study in North Gonder of the Amhara regional state, where out of 322 patients on treatment, 52% completed treatment, 40% were cured and over all 62% of patients treated successfully (15). In a study in South Africa, from 330 patients on DOTS in public health facilities the success rate was between 62% and 79%, cured cases, 58%-77% and defaulter accounts 3%-19%.

As some studies show an effective program successfully treats $\geq 85\%$ of detected cases (16,17) adherence to currently recommended DOTS strategy can achieve a cure rate up to 99% (14).

With regard to defaulters, almost one- third of the health facilities (30.0%), had a defaulter rate of 10% and above, which is also higher than the National target of $< 10\%$.

Over all quality: In the current study the over all quality of TB care is graded to be poor and 264(66.0%) of the patients received poor quality of care. Similar findings were reported from Egypt in which 49.8% of the cases received poor quality TB care.

This study showed that, during the initial phase of therapy, around two- third, 247(69.2%) of the patients were conforming to the DOTS recommended drug regimen. On the other hand, during the continuation phase only 187(46.9%) were conforming to DOTS recommended drug regimen. The study in Egypt reported that 74.7% and 87.5% of patients were conforming to the DOTS recommended drug regimen during the intensive and continuation phase respectively. In the continuation phase, it was seen that our finding was inconsistent with that of Egypt and this could be due to difference on the part of the performance of the health professionals.

Four variables were identified that significantly predicted treatment success, i.e. conformity to the recommended schedule of sputum smear microscopy, conformity to DOTS drug regimen during both intensive and continuation phase of therapy and quality of registration of patients' medical records. The above study in Egypt showed similar findings, except for conformity to DOTS drug regimen in the initial phase of therapy which was not found there to be predictor to treatment success.

In this study conforming to recommended schedule of sputum smear microscopy was found to be highly associated with treatment success with odds ratio of 58.6. This finding is different from that of the Egypt, in which conformity to DOTS drug regimen during the continuation phase was highly associated with treatment success, OR=33.46. The other finding which is not consistent with the Egypt finding was, conformity to DOTS drug regimen during the intensive phase of therapy was not associated with treatment success, while in our finding it has an association and the association is in the reverse direction.

This study revealed that there were several constraints in the provision of quality TB care. Limitation in laboratory reagents, slides for sputum microscopy and TBL manuals and posters in local language were observed. Infrequent health education for attendants and absence of health education for TB patients; absence of sputum quality control procedures and mechanism to trace defaulters and in availability of drugs on weekends were some of the constraints from the structural aspects of quality. Even though most of the providers had special training on DOTS, knowledge

gap was observed. Performance of the General Health Worker were found to be poor; and most of the cases, 66 % received poor quality care.

It is recommended that all program coordinators at different levels should act accordingly to resolve the problems timely and consistently. Appropriate training of the health workers and strengthening regular supervision and follow up was to be strengthened. Tracing of defaulters should be designed. Success of anti tuberculosis therapy could be ensured through strict adherence to all the elements of DOTS strategy.

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