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Effectiveness of Treatment Outcomes of Public Private Mix Tuberculosis Control Program in Eastern Nigeria

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Abstract
Effective tuberculosis treatment has been shown to have significant effect on the control of tuberculosis. Completion of treatment of active cases is therefore the most important priority of tuberculosis control programmes. Descriptive statistics with a retrospective cohort study design used to analyze secondary data set (2007-2010) of patients accessing TB-DOTS treatment in two facilities (Nnamdi Azikiwe University Teaching Hospital, NAUTH and Department of Health Services Tuberculosis and Leprosy Control Unit Nnewi North Local Government Area (L.G.A.) Secretariat, DHSTLCU) as public health facilities and other two facilities (Immaculate Heart of Catholic Church Hospital, IHCCH and Diocesan Anglican Communion Hospital, DACH) as private health facilities in Nnewi North L.G.A., Anambra State. Gender of patients were male: female 54%(1016 patients) : 46% (883 patients) and 53%(63 patients) : 47%(56 patients) in public and private health facilities respectively . Using WHO (1996) standards the health facilities adjudged as efficient were: in 2007, private facilities using the indicator of treatment failure rate; private facilities using the indicator of death rate; public facilities and private facilities using the indicator of transfer-out rate ; public facilities using the indicator of treatment completion rate. In 2008, effective health facilities were: private health facilities using the indicator of failure rate; public and private health facilities using the indicator of transfer-out rate; private facilities using the indicator of treatment completion rate. In 2009, effective health facilities were public and private health facilities using indicator of treatment failure rate; public and private health facilities using the indicator of death rate; public and private facilities using the indicator of transfer out; public and private facilities using the indicator of treatment completion rate. In 2010, effective health facilities were: private health facilities using the indicator of cure rate; private facilities using the indicator of death rate ; public and private facilities using the indicator of transfer-out; public facilities using the indicator of treatment completion rate. In conclusion, private health facilities were more effective than public health facilities by the several indicators over the four year period. Future research is needful to use primary and secondary data sets in assessment of TB control program effectiveness; technical efficiency assessment using non-parametric statistics will assess the validity of assessing effectiveness using only the WHO standards; identify centre-specific factors associated with poor treatment outcome; institutionalizing a reward system for effective TB-DOTS facilities will engender healthy competition in the Public Private Mix for sustained effectiveness; the Monitoring and Evaluation tools especially the treatment card for data capture should be improved upon for comprehensiveness of patients socio-economic history.
Keywords: Tuberculosis, Effectiveness, Treatments Outcomes, Public Private Mix

1. Introduction

World Health Organization(WHO) declared tuberculosis(TB) as a global emergency and developed a strategy known as Directly Observed Therapy Short-Course (DOTS) in order to combat the increasing menace of the disease(WHO 2003). The main aims of the strategy were to achieve the desired control objectives being to reduce mortality and morbidity ; reduce transmission; decrease the emergence of drugs resistant strains. (Antonie 2001; WHO 2003; World Bank 2006). Most countries have reported some encouraging results in controlling tuberculosis epidemic and demonstrated significant successes in implementing the DOTS strategy(Obermeyer , Abott-Clafter & Murray 2008; Shargie 2005; WHO 2006). However, much still remains to be accomplished if the epidemic is to be controlled in the face of dwindling resources (Maher, Hausler & Raviglione 1997, WHO 2003). Recommendations on how to evaluate treatment outcomes using standard categories have been issued by the WHO in conjunction with the International Union Against Tuberculosis and Lung Disease (Quing-Song, Yu-Hua & Ci-Yong 2007). Treatment outcomes in all patients should be routinely monitored by the epidemiological surveillance system; this would make it possible to recognize and amend system failures before the incidence of resistant isolates arise (Quing-Song, Yu-Hua & Ci-Yong 2007; Vree, Huong, & Duong 2007). In a study at the Makati Medical Center DOTS Clinic, a private health facility in Philippines , treatment success attained was 79.5%(108 patients), 10%(14 patients) had treatment failure; 5% (7 patients) were lost, 4.5%(6 patients) died and 1%(1 patient) transferred-out (Quelapio et al 2000) . In another related study in Eastern Cape province South Africa tuberculosis cure rate of 31.9% in 2003 to 39.7% in 2005 , success rate of 64% in 2004, defaulter rate of 20.1%, 15.9% and 30.3% in 2003, 2004 and 2005 respectively for patients that accessed public health DOTS care in 2005 was reported (Maimela 2009).

In Nigeria the treatment success rate of smear positive TB cases increased from 73% in 2004 to 82% in 2008 and 83 % in 2009. One third of States achieved the minimum of 85% success rate in 2009 (National Tuberculosis and Leprosy Control Program 2009). A study on tuberculosis patients receiving treatment at Ibadan, Nigeria showed cure rate 76.6%, failure rate 8.1% defaulter rate 6.6 %, transferred out 4.8% and death 1.9%. The cure rate varied significantly between treatment centres from 40% to 94.4% (Akinola, Abimbola & Afolabi 2009). In a study conducted in Kaduna State, Nigeria in both public and private health facilities a cure rate of 62.4%, treatment completion rate of 18.9% and a defaulter rate of 9.6% was attained. The cure rate among patients managed by the public health facilities was 64.1% compared to 60.9% among patients managed by the private health facilities. The defaulter rate was higher among patients managed by public health facilities (13.7%) compared to only 5.8% among patients managed by the private facilities . Treatment success, that is, the combination of cure rate and treatment completion was 81.3% among all patients. While the rate among patients managed by the private facilities (83.7%) was higher compared to 78.6% treatment success among those managed by the public facilities but the difference was not statistically significant (Gidado & Ejembi 2009). In another study in a private hospital in Imo state of Nigeria the outcomes obtained were 56% cure rate, 14.4 % defaulted ,11.1% died, and 1.7% treatment failure (Enwura et al 2009). Treatment outcomes are compared to the targets for new smear-positive pulmonary TB (PTB) set by the WHO which are 85% cure rate, 5% treatment completed, 1-2% treatment failure, 2-3% deaths, 5% lost, and 5% transfer out (WHO 1996).

2. Materials and Methods

Nnewi, a major commercial city in Eastern Nigeria, has an area dimension of 72 km^2 and an approximate population of 155,443 (77,517 males and 77,926 females) with average population density of 2,159 people per km^2 (National Population Census 2006). Igbo language is the vernacular though English is widely spoken. There are about 64 registered hospitals at Nnewi, 2 missionary hospitals, 1 tertiary (Nnamdi Azikiwe University Teaching Hospital) and 24 primary health centres (Anambra State Government Ministry of Health 2013).

The sampling technique used to select two public health facilities (Nnamdi Azikiwe University Teaching Hospital (NAUTH) and Department of Health Services Tuberculosis and Leprosy Unit (DHSTLCU)) and two private health facilities (Immaculate Heart of Catholic Church Hospital (IHCCH) and Diocese of Anglican Communion Hospital (DACH)) was a multi-stage sampling technique. Stage I : Selection of Nnewi North L.G.A. by purposive sampling technique from a sampling frame of 21 L.G.As in Anambra State. Stage II: Selection by systematic random sampling technique of two public health facilities and private health facilities that provide DOTS services for the past six years and registered with Anambra State Government Ministry of Health. The study population were tuberculosis patients that accessed anti-tuberculosis care in Nnewi North Local Government Area (LGA) at NAUTH , DHSTLCU, IHCCH and DACH from the period of 2007 to 2010 (a four year period). Only health facilities registered with the Anambra State Government Ministry of Health and have been providing Directly Observed Therapy Short course (DOTS) services for treating TB for the past six years were enlisted for the study. Also, patient treatment cards with information on any of the six treatment outcomes according to the WHO (International Union against Tuberculosis and Lung Disease 1996) and treatment completion rate outcome according to Maimela (2009) , socio-demographics (that is, age and sex) ,

HIV status , year of treatment initiation and category of DOTS administered were evaluated. Treatment outcome definitions, adapted from an international standard classification, were as follows: (1) cured (a smear-positive patient based on the medical record, who had a negative sputum smear during the eighth month of treatment and on at least one previous occasion); (2) died (a patient who died during treatment irrespective of cause); (3) failed (a smear-positive patient who remained smear-positive at the fifth month of treatment); (4) defaulted (a patient who did not come back to complete chemotherapy and there was no evidence of cure through the sputum result during the fifth month of therapy), (5) treatment interruption (a patient who did not collect medications for 2 months or more at a particular time or at interval, but still come back for treatment and in the 8 th month of treatment, the sputum result was positive), and (6) transferred out (a patient who was transferred to another treatment center and for whom treatment results are not known) (International Union against Tuberculosis and Lung Disease 1996). Another terminology hereby analysed, treatment completion rate is the percentage of patients who completed treatment but without laboratory proof of cure, of new smear positive patients (Maimela 2009). Descriptive statistics with a retrospective cohort study design was used to evaluate the treatment cards of TB patients accessing anti-tuberculosis for treatment outcome for the period of 2007-2010. Data set of the selected treatment cards that have information of inclusion criteria were extracted using a checklist Data was analysed using computer software package SPSS version 17. Results of variables were represented in tables. Ethical approval for this study was obtained from the Nnamdi Azikiwe University/ Teaching Hospital Ethical Committee (NAU/NAUTHEC) . Permission to conduct this study was obtained from heads of the four DOTS Centres in Nnewi North Local Government Area.

3. Results

Gender of patients were male: female 54%(1016 patients) : 46% (883 patients) and 53%(63 patients) : 47%(56 patients) in public and private health facilities respectively(see Table 1). The analysed treatment outcomes of public-private health facilities in Nnewi North L.G.A that provided Directly Observed Therapy Short course (DOTS) to tuberculosis patients from 2007-2010 were: cured, defaulted, interrupted, transferred-out, failure, death and treatment completion, however, for assessment of effectiveness of health facilities; the cut-off indicators adopted (WHO 1996) are 85% cured rate, 5% treatment completion, 2% treatment failure, 3% deaths and 5% transferred- out. Thus, effective public-private health facilities are those that (i) equal to or greater than 85% cured rate outcome, (ii) less than 2% treatment failure rate outcome ,(iii) less than 3% death rate outcome ,(iv) less than 5% transfer- out rate outcome, and (v) equal to or greater than 5% treatment completion rate outcome. From tables 2 and 3, using WHO (1996) standards the health facilities adjudged as efficient were: in 2007, private facilities using the indicator of treatment failure rate; private facilities using the indicator of death rate; public facilities and private facilities using the indicator of transfer-out rate ; public facilities using the indicator of treatment completion rate. In 2008, effective health facilities were: private health facilities using the indicator of failure rate; public and private health facilities using the indicator of transfer-out rate; private facilities using the indicator of treatment completion rate. In 2009, effective health facilities were public and private health facilities using indicator of treatment failure rate; public and private health facilities using the indicator of death rate; public and private facilities using the indicator of transfer out; public and private facilities using the indicator of treatment completion rate. In 2010, effective health facilities were: private health facilities using the indicator of cure rate; private facilities using the indicator of death rate ; public and private facilities using the indicator of transfer-out; public facilities using the indicator of treatment completion rate.

Table 1: Frequency of gender distribution of patients in public and private health facilities

	Public facilities	Private facilities	Total
Male	1016 (54%)	63 (53%)	1079
Female	883 (46%)	56(47%)	939
Total	1899 (100%)	119(100%)	2018

Table 2: Treatment Outcomes of Patients Accessing DOTS Therapy at each of the two categories of health facilities (public and private health facilities) in Nnewi North Local Government Area, Anambra State, Nigeria for the periods 2007-2010.

cured	Year	%	Public Hosp.	%	Private Hosp.	%
	2007	83	157	35	10	83
	2008	50	165	51	6	43
	2009	56	166	26	6	71
	2010	71	226	45	39	86
Defaulted	Year					
	2007	17	108	24	2	17
	2008	30	71	22	4	29
	2009	11	240	40	1	7
	2010	14	116	23	3	8
Interrupted	Year					
	2007	0	4	1	0	0
	2008	0	41	13	0	0
	2009	0	12	2	0	0
	2010	0	17	3	0	0
Transferred	Year					
	2007	0	12	3	0	0
	2008	10	16	5	1	1
	2009	0	13	2	0	0
	2010	7	23	5	1	2
Failure	year					
	2007	0	7	2	0	0
	2008	0	8	3	0	0
	2009	0	8	1	0	0
	2010	0	14	3	1	2
Death	Year					
	2007	0	18	4	0	0
	2008	10	12	4	1	7
	2009	0	12	2	0	0
	2010	0	36	7	0	0
Treatment Completion	Year					
	2007	0	141	32	0	0
	2008	0	9	3	2	14
	2009	33	157	26	3	21
	2010	7	73	14	1	2
Total						

Key: Public health facilities (NAUTH and DHSTLCU patients load combined and analyzed) and Private health facilities (IHCCH and DACH patients load combined and analyzed)

Table 3: Determination of Effective Public-Private Mix Health Facilities at the level of public and private health facilities using WHO standards (1996)

S/N	Hospitals	Cured ≥ 85%	Treatment Failure <2%	Deaths <3%	Transferred-Out < 5%	Treatment Completed ≥ 5%
2007	Public	No	No	No	Yes	Yes
	Private	No	Yes	Yes	Yes	No
2008	Public	No	No	No	Yes	No
	Private	No	Yes	No	Yes	Yes
2009	Public	No	Yes	Yes	Yes	Yes
	Private	No	Yes	Yes	Yes	Yes
2010	Public	No	No	No	Yes	Yes
	Private	Yes	Yes	Yes	Yes	No

4. Discussion

It is important to monitor the outcome of treatment in order to evaluate the effectiveness of DOTS intervention notwithstanding the primary aim of Public Private Partnership in TB control in Nigeria to engage all healthcare providers in TB care and control (National Tuberculosis and Leprosy Control program 2008 ; Obasanya 2012).
This study found that a greater percentage of the patients in the cohort in public and private health facilities was male is consistent with other reports (Salami & Oluboyo 2003; Scholten ,Fujiwara & Frieden1999; Ukwuaja et al 2013).The public health facilities saw significantly more patients but had less effective treatment outcome than the private health care facilities. This is consistent with the reports of Gidado and Ejembi (2009) where the private healthcare facilities in northern Nigeria had more effective treatment outcome and Krishnan and Kapoor (2006) in northern India where higher cure was observed among patients managed by the private health sector . Less patient load at the private health facilities is contrary to the report of Gidado and Ejembi (2009) . Most likely the lesser patient load at the private facilities matched proportionately with adequate resources, hence, the effectiveness in most of treatment outcome indicators adjudged against unlike at the public health facilities where more patients load was inversely related with resources. However, another study in India showed no significant difference in the outcome of treatment between the public and private health facilities (Dewan , Lal & Lonnroth 2006). This study's trend of cure rate in the public and private health facilities improved with decline of death rate over the four year period which is consistent with that obtained in a similar study in China (WHO 2004) . This study's cure rate (86%)- and the only record for public and private health facilities evaluated! - for the private health facilities exceeded the 85% minimum target (WHO 1996) compared to that of a similar study conducted in a private health facility in Philippines which did not meet the WHO target (Quelapio et al 2000). This is a commendable feat for a resource constraint economy like (eastern) Nigeria. In this study, over the four year period the public health facilities never met the WHO target as obtained in a similar study in South Africa (Maimela 2009). This study's treatment outcome in private health facilities was more effective using the WHO treatment outcome indicators except only on treatment completion where its equally as effective in comparison to another study in eastern Nigeria (Enwura 2009). Also, this study's treatment outcome in public health facilities was ineffective using the WHO treatment failure outcome indicator except only in 2009 where its equally as effective in comparison to a related study in eastern Nigeria (Ukwuaja et al 2013). This calls for immediate attention of all stakeholders involved in management of the public health facilities to resolve the problems causing this trend otherwise this could give rise to increase in prevalence of strains of multi-drug resistance TB if category II DOTS were to be the failed therapy!
The limitations of the study are that private DOTS services providers used in eastern Nigeria were all faith-based, non-profit health facilities and so there was no opportunity to compare the TB programming and TB treatment outcome of the public facilities with those of private for-profit organizations. Also, the accuracy of secondary data collected from patient's record card for the study depended on the accuracy and completeness of the record cards as filled in by the health workers in the facilities.

5. Conclusion

Private health facilities were more effective than public facilities by the several indicators over the four year period. Future research is needful to use primary and secondary data sets in assessment of TB control program effectiveness; technical efficiency assessment using non-parametric statistics will assess the validity of assessing effectiveness using only the WHO standards; identify centre-specific factors associated with poor treatment

outcome; institutionalizing a reward system for effective TB-DOTS facilities will engender healthy competition in the Public Private Mix for sustained effectiveness; the Monitoring and Evaluation tools especially the treatment card for data capture should be improved upon for comprehensiveness of patients socio-economic history.

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