

The Ukrainian SORT IT Course

Primary healthcare centers engagement in tuberculosis treatment in Ukraine

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Abstract

Introduction: We assessed the influence of a result-based financing (RBF) model, which included incentives for Primary Healthcare facilities on TB treatment outcomes.

Methodology: We compared TB patients > 17 years and their treatment outcomes among those who did and did not benefit from RBF-model in 14 districts of Odeska oblast, Ukraine in 2017. Log-binomial regression was used to examine factors associated with being included in RBF-model.

Results: Of 2,269 reported TB patients, 308 (14%) were included in RBF-model. Most patients in the RBF-model were from rural areas 229 (74%), unemployed 218 (71%), and HIV-infected 131 (43%). Individuals from urban areas (Adjusted risk ratio, ARR =0.9, 95% Confidence Interval, CI:0.89-0.94), having drug-resistant TB (ARR = 0.3, 95% CI: 0.18-0.45), and relapse TB (ARR = 0.6, 95% CI:0.40-0.83) were less likely to be included in RBF-model. Favorable outcomes in new/relapse cases with RBF-model was 89% compared with 41% ($p < 0.001$) without RBF. Similarly, for other retreatment this was 83% versus 40% ($p < 0.001$). Failures in the no-RBF group was 29% for new and relapse cases while for other retreatment cases, it was 26% (significantly higher than in the RBF-model).

Conclusion: RBF-model is effective in achieving high levels of favorable TB treatment outcomes. Almost three-in-ten TB patients in non-RBF category failed TB treatment despite having drug-susceptible TB. Efforts are now needed to include it within ongoing public health reforms and assess the feasibility of scaling-up this intervention through implementation research and dedicated funding.

Key words: tuberculosis; results-based financing; patient-centered care; DOT.

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Introduction

The World Health Organization (WHO) estimates that there were 10 million new tuberculosis (TB) cases and 1.6 million TB deaths worldwide in 2017 [1]. One of the challenges for TB control is to ensure that diagnosed TB patients complete a full course of treatment to achieve treatment success and limit the development of drug resistance.

The decentralized patient-centered model of care promoted by the WHO advocates for moving TB screening, diagnosis and treatment closer to the population. This intends to reduce the load on hospitals and improve adherence to anti-tuberculosis treatment when offered closer to the community [2].

Ukraine is one of the top 10 high burden multi-drug resistant (MDR-TB) countries in the world, with proportions of MDR-TB among new and previously treated TB cases being 24% and 58% respectively [1-

3]. The estimated TB and drug-resistant TB (DR-TB) burden are 37,000 (84 per 100,000 population) and 13,000 (30 per 100,000) accordingly. Treatment outcomes among drug-susceptible TB (DS-TB) - 76% and 51% for MDR-TB [1].

TB management in Ukraine is principally hospital-centered with financing allocated per number of hospitalized TB patients [4]. No similar funding is allocated to Primary Health Care (PHC) centers for TB management. Transition from a hospital to a patient-centered model would require changing this paradigm with funding being allocated to PHCs [2].

To increase the PHC centers engagement in TB management, the International Charitable Foundation “Alliance for Public Health” (APH, a Non-governmental organization) in Ukraine, introduced a pilot project in 2017, which was called the “Results-based financing model for decentralized and Directly

Observed TB Treatment (DOT) for DS-TB and DR-TB” (hereinafter termed the “RBF-model”). This pilot project covered patients at PHC centers in 14 districts of Odeska oblast of Ukraine. The RBF model introduced financial incentives to PHC centers for each TB patient included for ambulatory TB treatment and for achieving favorable treatment outcomes. The RBF approach is widely implemented in the health sector in low and middle income countries [5].

That is the first study in Ukraine to assess the influence of such an intervention on TB treatment outcomes in relation to the WHO targets. There has also not been any previous operational experience in this regard within the National TB program of Ukraine.

The specific objectives of this study were to compare the a) baseline characteristics for DS-TB and DR-TB patients who were and were not included in the RBF-model b) factors associated with being included in the RBF-model and c) the effect of the RBF-model on TB treatment outcomes.

Methodology

Study design

This was a retrospective comparative cohort study using routine programme data.

General setting

Ukraine has a centralized vertical TB care system that is mainly based on in-hospital care with 14.5 thousand hospital beds available nationally (3 per 10,000 population) [6]. More than 90% of smear positive TB patients (91% of DR-TB and 93% of DS-TB) start their treatment in hospitals [7]. The current financing model (based on hospital beds) promotes long stays in hospital with on average 92 days of bed stay [6]. Specialized TB care is provided by TB facilities located in oblast and district centers. TB management in Ukraine is in line with international standards [4]. Since 2010 Ukraine has introduced a National electronic register for TB patients – “eTB-manager” – that includes data on all TB patients registered in the country. As of August 2015, the consistency between paper-based and electronically generated reports was approximately 99% [8].

PHC centers are located at district and sub-district level and offer basic health care for a variety of medical illnesses for the general population under ambulatory conditions. Engagement of PHC centers in TB management in Ukraine is highly recommended by WHO and has been discussed for several years, however this engagement had remained limited [4,9,10].

The RBF project promoted a new way of financing of the PHC settings for offering ambulatory TB treatment. The PHC centers received monthly payments for every patient that received ambulatory DOT at their facilities (equivalent to \$0.5 per 1 patient per 1 day) as well as quarterly incentives for achieving treatment success (“cured” and “treatment completed”). Incentives depended on patients’ TB type with higher incentives for DR-TB patient (equivalent to \$12) and lower incentives for DS-TB patients (equivalent to \$10). Within this RBF-model, PHC centers provided DOT services to DS-TB and DR-TB patients, while district TB doctors were responsible for the regimen design, overall management of the same patients and for the treatment outcomes reporting. The only inclusion criteria for the participation in RBF project was the patient’s agreement to be treated in PHC center from the treatment course beginning or right after the discharge from hospital. Patients treated in ambulatory settings more than 1 month without DOT were not included in RBF project, since the high probability of mycobacterial resistance. All medical and psychosocial services for TB/DR-TB patients were organized by PHC centers and were not a subject for APH control. No additional human resources were engaged within the RBF project. Services’ provision control and quality monitoring of TB treatment was conducted by APH project managers and there was a formal contract signed between APH and each PHC center to ensure accountability and reporting. Data were verified monthly prior to payments to PHC centers.

Study population, study sites and study period

All TB patients above 17 years of age who initiated ambulatory TB treatment at any stage of treatment at different health facilities in 14 districts of Odeska oblast between January and December 2017 were included. We excluded hospital patient who died, failed, or were lost to follow up in hospitals prior to starting ambulatory treatment at PHCs.

Data sources

Socio-demographic and clinical data were extracted from the eTB-manager of Odeska oblast. Baseline patient data and treatment outcomes were cross-checked and validated with health facility registers.

Analysis and statistics

Data analysis was conducted using the STATA software (version 15. College Station, TX, USA). After conducting basic descriptive statistics the chi-square test was used to compare differences between groups of

independent variables. Treatment outcomes were assessed only for drug-susceptible TB patients who had completed their treatment by December 31, 2017. Log binomial regression was used to examine factors associated with being included in the RBF-model. The levels of significance were set at 5%. Proportion differences with 95% confidence intervals (CI) were used to assess the difference in favorable treatment outcomes between patients treated in RBF-model and no-RBF-model facilities.

Ethics

Permission to conduct the study was secured from the Senior Management of the Alliance for Public Health in Ukraine and ethics approval was obtained from the Institutional Review Board of the Ukrainian Institute on Public Health Policy, Kiev, Ukraine.

Results

Characteristics for TB patients who were and were not included in the RBF-model and associated factors

Of 2,269 TB patients treated through ambulatory care at study districts, 308 (14%) were included in the RBF-model and 1961(87%) were treated at facilities without RBF.

Figure 1 shows the proportion of ambulatory TB patients enrolled in the RBF-model. The proportion of patients enrolled by district varied (1%-24%). The lowest enrolment in the RBF-model was in Liubashivsky (1%), Lymansky (3%) districts and Izmail-city (4%).

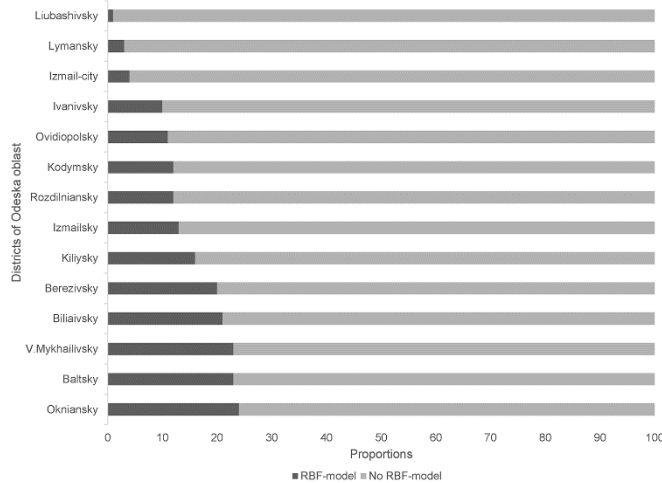
Table 1 shows the socio-demographic and clinical characteristics of patients enrolled and not enrolled in the RBF-model. Within the RBF-model, there were more males 206/308 (67%), patients from rural areas 229/308 (74%), HIV infected 131/308 (43%) and unemployed persons 218/308 (71%).

Table 1. Socio-demographical and clinical characteristics of TB patients who were and were not included in the Results Based Financing model in 14 regions of Odeska Oblast, Ukraine, 2017 (N=2,269).

Characteristics	RBF N (%)	Non-RBF N (%)	RR	95% CI	ARR	95% CI	p-value
Total	308 (14)	1,961 (86)					
Gender							
Male	206 (67)	1,351 (69)	0.9	0.71-1.17			
Female	102 (33)	610 (31)	1.0				
Age, years (Median ± IQR)	39 (30-48)	39 (32-47)					
18-29	67 (22)	351 (18)	1.0				
30-49	174 (56)	1,190 (61)	0.8	0.56-1.04			
50+	67 (22)	420 (21)	0.2	0.58-1.21			
Region							
Urban	79 (26)	748 (38)	0.6	0.88-0.93	0.9	0.89-0.94	< 0.001
Rural	229 (74)	1,213 (62)	1.0				
Risk group*							
No risk	31 (10)	205 (10)	1.0	0.64-1.43			
HIV+	131 (43)	854 (44)	1.0	0.75-1.22			
PWID	10 (3)	35 (2)	1.8	0.90-3.77			
Alcohol use	21 (7)	92 (5)	1.5	0.91-2.43			
Homeless	1 (0.3)	31 (2)	0.2	0.03-1.49			
Unemployed	218 (71)	1,473 (75)	0.8	0.62-1.05			
Imprisoned	3 (1)	18 (1)	1.1	0.31-3.63			
TB category							
Susceptible TB	290 (94)	1,505 (77)	1.0				
Drug-resistant TB	18 (6)	456 (23)	0.2	0.13-0.33	0.3	0.18-0.45	< 0.001
History of previous treatment							
New case	256 (83)	1,366 (70)	1.0				
Relapse	29 (9)	335 (17)	0.5	0.31-0.69	0.6	0.40-0.83	< 0.001
Treatment after failure	17 (5)	154 (8)	0.8	0.47-1.35			
Treatment after LTFU	5 (2)	74 (4)	0.4	0.14-0.90			
Other previous treatment	1 (< 1)	32 (1)	0.2	0.02-1.20			

RBF = result-based financing model; RR = relative risk; CI = confidence interval; ARR = adjusted risk ratio; IQR = interquartile range; HIV = human immunodeficiency virus; PWID = **people** who inject drugs; TB = tuberculosis; LTFU= loss to follow-up; *Indicates the number and proportions of the “yes” category for no risk, and each of the risk group variables indicated thereafter.

Figure 1. Proportion of patients involved in the Result-Based Financing model at the Primary Health Care settings, Odeska oblast, 2017.



RBF = result-based financing model.

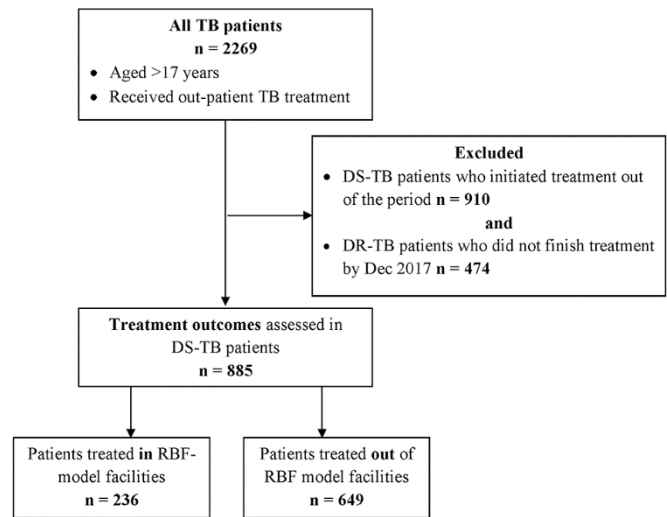
On multivariate analysis individuals from urban areas (ARR = 0.9, 95% CI = 0.89-0.94), having drug-resistant TB (ARR = 0.3, 95% CI = 0.18-0.45), and relapse TB (ARR = 0.6, 95% CI = 0.40-0.83) were significantly less likely to be included in the RBF-model (Table 1).

TB treatment outcomes in relation to the RBF-model

Figure 2 shows the flow of patients included and not included in the RBF-model for assessment of TB treatment outcomes.

Table 2 shows the TB treatment outcomes in relation to RBF and no RBF. Both new/relapse and other retreatment cases have significantly higher proportions of favorable treatment outcomes when exposed to RBF. For the combined category of new and relapse TB cases, 89% had favorable treatment

Figure 2. Flow chart of TB patients included and not included in Result-Based Financing model for assessment of treatment outcomes, 14 regions of Odeska oblast, Ukraine, July 2016 – June 2017.



RBF: result-based financing model; DR-TB: drug-resistant tuberculosis; DS-TB: drug-susceptible tuberculosis.

outcomes in the RBF group compared to 48% without RBF (percentage difference = 41; 95% CI: 35-50). For other retreatment cases, favorable outcomes with RBF were 83% compared to 40% without RBF (percentage difference = 43%; 95% CI: 12-63). Failures in the no-RBF group was 28% for new and relapse cases while for other retreatment cases, it was 26 (significantly higher than in the RBF-model).

Discussion

This is the first study that has assessed the effectiveness of providing incentives for ambulatory TB treatment at PHC level in the high MDR-TB burden setting of Ukraine. Overall, district level enrollment of

Table 2. Treatment outcomes of drug susceptible TB patients who were and were not included in the Result Based Financing model, 14 regions of Odeska oblast, Ukraine, July 2016 – June 2017 (N =885).

	New and relapse cases		Other retreatment cases	
	RBF N (%)	Non-RBF N (%)	RBF N (%)	Non-RBF N (%)
Total	218	581	18	68
Favorable outcomes	193 (89)	268 (46)	15 (83)	27 (40)
Cured	82 (38)	127 (22)	11 (61)	14 (21)
Treatment completed	111 (51)	141 (24)	4 (22)	13 (19)
<i>Percent differences^a</i>		<i>41 (35-50)</i>		<i>43 (12-63)</i>
Unfavorable outcomes	25 (11)	296 (51)	3 (17)	41 (60)
Failed	17 (8)	162 (28)	2 (11)	18 (26)
LTFU	5 (2)	46 (8)	1 (6)	10 (15)
Died	3 (1)	88 (15)		13 (19)
Unevaluated outcome^b	0	17 (3)		

RBF = result-based financing model; LTFU = lost to follow up; ^a Percent difference for favorable outcomes; ^b Unevaluated outcome – not recorded in the National TB registry.

TB patients in RBF was low (14%) with individuals from urban areas, relapse and drug-resistant TB cases being significantly less likely to be enrolled. Favorable treatment outcomes in the RBF group were significantly higher (83-89%) than in the no-RBF group (40-48%). Almost three-in-ten TB patients in non-RBF category failed TB treatment despite having drug-susceptible TB.

As Ukraine, strives to improve overall TB treatment outcomes and avoid TB treatment failures (that breed drug resistance), these findings are timely as they highlight the considerable public health benefit associated with the RBF-model. The study also provides evidence supporting the Ukraine National Tuberculosis Program perspective of introduction of the RBF at PHCs, countrywide.

The study strengths were that it was conducted in one of the largest oblasts of Ukraine and involved 14 districts and thus likely to be representative of the operational reality. All consecutive patients could be enrolled and data was rigorously monitored by APH.

The main study limitation is that we did not know the specific reasons why some patients were enrolled in RBF while others were not. Was there a perverse selection bias by health workers who gave preference to less severe patients? Since we restricted assessment of treatment outcomes to drug-susceptible TB patients, the non-RBF group should have had an equal chance of achieving similar outcomes as those in RBF. The fact that treatment failures were significantly lower in the RBF-group suggests that patients must have been “better cared for” by PHCs staff possibly due to the incentives. These aspects merits further operational and qualitative research.

This study has some policy and practice implications. First, since the RBF-model showed significant benefit under operational conditions, it would seem logical to consider the feasibility of scaling-up this intervention further. Various aspects will need to be assessed including: how to increase district enrollment of patients into RBF, how to scale-up in a phased manner, what are the additional staff requirements at PHCs to provide decentralized DOTS, how to ensure close monitoring and supervision and importantly, who will pay for the added cost of incentives.

The Country Global Fund mechanism could provide an opportunity for initial funds until the RBF-model is fully integrated within the Public Health reforms. This could provide the initial financial boost along the journey to eventual country self-reliance.

Second, individuals from urban areas, those with relapse and drug-resistant TB were less likely to be enrolled in RBF and this might reflect patient and health-system factors. We may assume that more severe TB patients might lack confidence in the capacity of PHC workers to take care of them. Individuals from urban areas might wish to continue their TB treatment at hospitals that are within easy reach of their homes. TB doctors might also be clinging to keep patients at TB facility level so as to not lose control of them. This aspect requires dialogue between TB facilities and PHC workers, confidence building and joint trainings.

Finally, the impressive TB treatment success which crossed (or was close) to the 85% WHO threshold in those who received ambulatory treatment in RBF-model is important evidence highlighting its added benefit to improving patient survival and curbing the emergence and spread of drug resistant TB.

In conclusion, the RBF-model has shown effectiveness in achieving high levels of favorable TB treatment outcomes. Efforts are now needed to include it within ongoing public health reforms and assess the feasibility of scaling-up this intervention through implementation research and dedicated funding.

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