

## TB financing in East Europe promotes unnecessary hospital admissions: the case of Armenia

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**Key words:** tuberculosis; MDR-TB; XDR-TB; Armenia; financing

*J Infect Dev Ctries* 2013; 7(3):289-292.

(Received 11 February 2013 – Accepted 25 February 2013)

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### Background

Based on cost-effectiveness considerations and on the risk of nosocomial transmission of *Mycobacterium tuberculosis* strains, the World Health Organization (WHO) and other international institutions recommend to minimize unnecessary hospitalization of tuberculosis (TB) cases [1,2,3,4].

As in other Former Soviet Union (FSU) countries, the organisations of TB services in Armenia are heavily based on vertical and specialized services.

In Armenia, a country of 3.2 million inhabitants, TB is one of the major public health problems with overall notification and estimated mortality rates of 41 and 8.8 cases per 100,000 population in 2011, respectively [5,6]. The prevalence of multidrug-resistant (MDR-TB) was 9.4% and 43.2% among new and previously treated cases, respectively, with 11.9% of them estimated to be extensively drug-resistant (XDR-TB) [6,7].

Specialized TB services include 9 in-patient TB departments, 73 out-patient TB units (called TB cabinets) based in general health-care facilities, and 31 laboratories providing sputum smear microscopy, while culture and drug susceptibility testing is performed in the National TB Reference Laboratory.

Following WHO recommendations, the Armenian National TB Programme (NTP) expanded the basic package of services provided in out-patient settings, allowing free access/free of charge TB diagnosis and treatment to the population, to achieve the global TB targets in the WHO European Region under the National Strategic Plan 2007-2015 and Consolidated Action Plan to Prevent and Combat M/XDR-TB in the WHO European Region 2011-2015 [8].

Despite programme success in reducing the default rate of new sputum smear-positive pulmonary TB patients from 14% to 7% in five years, the treatment success rate (72% in 2011) of the diagnosed cases is far below WHO targets [6]. The main shortcomings identified by the WHO Programme Review conducted in 2011 [7] include an alarming prevalence of M/XDR-TB, suggesting that directly observed therapy (DOT) is not systematically applied. An analysis of risk factors for MDR-TB in Armenia proved that after completion of the hospital phase of treatment, a relevant proportion of patients (6.1%; 8/133) interrupts treatment during the ambulatory phase, with less than 30% of them undergoing DOT [9].

In addition, TB case detection for new sputum smear-positive pulmonary TB patients remains as low

as 27%. To improve programme performance and expand patient-centered approaches, it is important to strengthen outpatient services to improve TB detection and treatment adherence in Armenia. For the above-mentioned reasons, the WHO Programme Review has begun to promote ambulatory diagnosis and treatment for TB patients to reduce unnecessary hospitalizations and excessive costs [7].

The costs of the TB services, such as staff salaries, in-patient and ambulatory care costs, are largely covered by the government, with most of the health expenditure represented by recurrent costs (96.7% in 2011) versus capital costs (3.3%) [9]. The Global Fund supports diagnosis and treatment to manage M/XDR-TB cases.

The current funding scheme for hospital-based care for TB relies on bed occupancy/days. The cost of one bed per day in 2012 was 8,900 Armenian Drams (AMD) ( $\approx 20$  €), while the cost of one TB cabinet visit is about 5.6 times cheaper (about 1,600 AMD  $\approx 3$  €) [10].

The refund related to the out-patient activities is fixed, based on the catchment population of the facility, so that staff is not motivated to increase the daily number of medical visits. In other words, physicians, receiving a fixed salary, are not encouraged to manage TB cases in an out-patient setting, and prefer to refer them for admission. As a consequence, 80% of the TB case-load is absorbed by the in-patient system against 20% managed by the ambulatory system. Unfortunately, this mechanism creates an unfair competition for resources between the “old” hospital-centred and the “new” patient-centred model. The Ministry of Health is considering the options to revise the funding mechanism for TB services; however, no changes have been instituted as of today.

The aims of the present study are to 1) evaluate the effect of maintaining the present funding scheme based on in- versus out-patient management, and 2) estimate the savings that might be achieved limiting the unnecessary hospitalizations of non-infectious (sputum smear-negative and extrapulmonary) TB cases.

## Methodology

A retrospective analysis of monitoring and evaluating data from the newly implemented NTP electronic database was performed using national data for 2011 and 2012 (first six months).

In addition to quarterly routine recording and reporting notifications, a standard questionnaire used

by TB supervisors during their monitoring visits to document referral to hospital-based care and in- versus out-patient management was analyzed. Indicators of TB care management (2011 versus 2012) were calculated and compared using Epi Info 7 statistical software. Chi square test was used to test qualitative variables.

## Results

A consistent number of TB suspects is still referred to in-patient departments for diagnosis (1,450/4,389; 33% versus 668/1,939; 34.5%) with no statistically significant differences between 2011 and 2012 ( $p = 0.44$ ), while the proportion of TB cases detected among all TB suspects referred to in-patient departments for diagnosis slightly decreased (551/1,450; 38% versus 234/668; 35%;  $p = 0.4$ ).

The proportion of TB patients diagnosed in TB out-patient units out of the total number registered significantly decreased from 45.2% to 35.6% (527/1,165 versus 273/766;  $p < 0.001$ ). Furthermore, 63% of TB suspects referred for diagnosis to hospitals (1,333/2,118) in the study period were diagnosed as negative for TB.

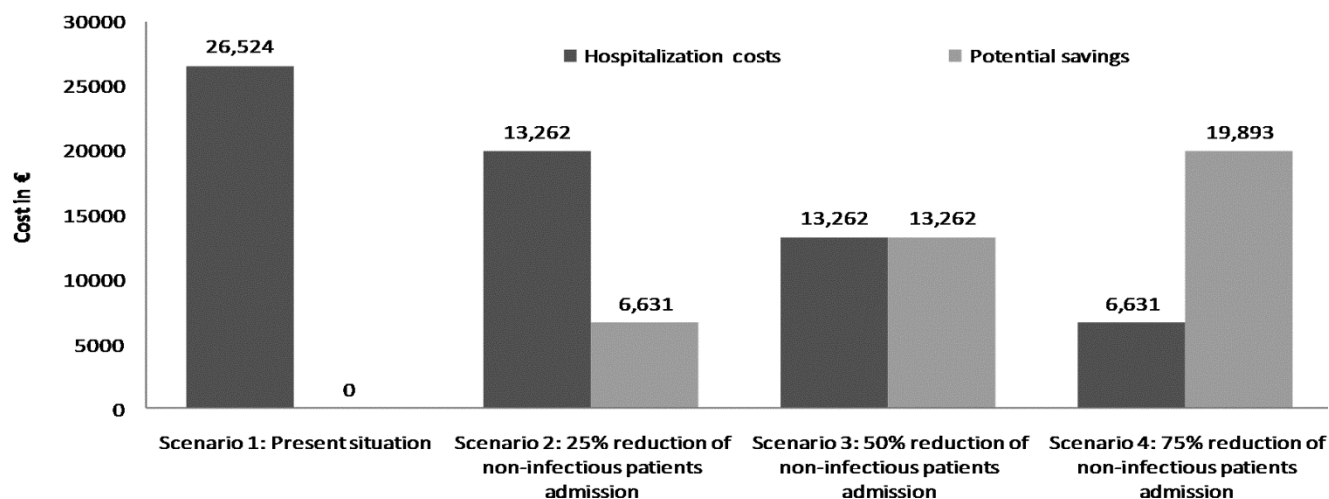
During the study period, the proportion of patients referred to hospitals to initiate their treatment was 97% for sputum smear-positive ( $n = 607$ ) and 90% for sputum smear-negative and extra-pulmonary ( $n = 1,755$ ) patients. The proportion of sputum smear-positive cases represented 25.7% (607/2,362) of the total number of registered cases; therefore, most of the hospitalized patients were sputum smear-negative and extra-pulmonary cases.

The costs for a single day of hospital admission in Armenia (2012 costs; 2011 notification data) and the potential savings that can be achieved for each day of inpatient management avoided (in favour of out-patient management) are summarised in the Figure. With a feasible reduction of hospital admission of 75% of these cases, about 20,000 € might be saved every day, for a total of 7,260,945 € per year.

## Discussion

The potential savings that Armenia can re-invest in the TB programme are significant. Established clinical traditions which are prevalent in FSU countries, such as hospitalising non-infectious TB cases for the intensive phase of treatment (2 months) and admitting TB suspects for further investigations, do not comply with international recommendations, and pose infection control problems on top of generating unnecessary costs [1,2,3,4]. In addition, unnecessary

**Figure.** Potential cost reductions and savings (in €) for each day of hospitalisation avoided in non-infectious TB cases (sputum smear negative and extrapulmonary) using Armenia 2011 notification rates as baseline



Scenario 1: present situation; Scenario 2: 25% of non-infectious TB cases not admitted; Scenario 3: 50% of non-infectious TB cases not admitted; Scenario 4: 75% of non-infectious TB cases not admitted

hospital admission imposes financial and psychosocial burdens for TB patients.

In Armenia over one third of TB suspects are referred to TB hospitals (by law, for seven days) for diagnosis, with only 35% of them being diagnosed with active TB.

The study results demonstrate, for the first time in a FSU setting, the savings which can be achieved by decreasing the load of patients sent to hospitals for diagnostic purposes and increasing the proportion of TB patients diagnosed in TB out-patient units.

Furthermore, the Armenian experience shows that no policy change in this direction can be achieved if health-care TB funding mechanisms are not modified. The per-bed daily refund scheme blocks any possible reform of TB admission policies [1].

The economic savings that such a change will generate could be directed to strengthen human resources at the primary health-care level, with improved quality of life for patients and reduced risk of nosocomial transmission [1,2,3,4].

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**Conflict of interests:** No conflict of interests is declared.