The Armenian SORT IT Course

Tuberculosis care services in Armenia: What has changed since the 2014 reform?

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Abstract
Introduction: In efforts to reach the 2020 Tuberculosis targets, the WHO advocates for an outpatient, people-centered model of TB care. To this end, the TB care system in Armenia underwent structural and financing reforms in 2014. Financing mechanism for inpatient TB facilities was changed from a fee per bed/day to a mixed type of financing that includes fixed and variable costs eliminating incentives for unnecessary and extended hospitalizations. Unfortunately, outpatient facilities continue to be financed through per-capita mechanism, resulting in high number of referrals and draining resources. This study aimed to assess the implementation of these reforms within the Armenian TB care system.
Methodology: This was a retrospective cross-sectional study using nationwide programme data and survey data collected from healthcare facilities.
Results: In 2017 a total of 901 TB patients were registered in outpatient facilities. Only 7.6% of total TB cases were diagnosed in outpatient facilities and 30.9% of the presumptive TB cases were referred to inpatient facilities. The number of hospitalizations was reduced by 76% from 2013 to 2017. The average duration of stay reduced as well from 55+ days to 37 days. However, the proportion of smear negative TB patients remains high among all hospitalized patients (63.8%).
Conclusions: Overall, the reform has been successful, however unnecessary hospitalizations persist. Our results indicate there a need to go upstream for a structural and financial reform of the outpatient sector to complete Armenia's TB healthcare reform and improve both patient outcomes and efficient use of system resources.

Key words: Tuberculosis; health reform; financing; Armenia; operational research; SORT IT.

Introduction

Tuberculosis (TB) remains one of the world's major public health concerns. An estimated 1.3 million TB deaths were reported in 2017 with over 10.0 million cases worldwide. Further, drug-resistant TB continues to worsen, increasing pressure on health systems to contain and treat exiting TB cases [1].

In recent years, studies have consistently shown outpatient TB care to be much more cost-effective than comparable inpatient treatment [2–4]. Accordingly, in efforts to reach the 2020 90-(90)-90 targets, the World Health Organization (WHO) continues to advocate for a people-centered model of care based in outpatient settings rather than inpatient [5].

Although continuous reforms have led to a dramatic decrease in TB notification in recent years, TB remains a major public health issue in Armenia. In 2017, the notification rate of TB in Armenia was approximately 29 per 100,000 population, compared to 47 in 2013, and TB mortality rates for the same period were 1.8 per 100,000 population, compared to 1.6 in 2013 which could be partly attributed to the rise in the number of drug-resistant (DR) and the extensively drug-resistant (XDR) forms of TB which pose a serious public health and social challenges for the country [6].

In Armenia, all TB care services, both inpatient and outpatient, are provided to patients at no cost. Funding for TB care is provided by the Armenian government (42%) as well as international agencies and donors (58%), ensuring access to TB care for the entire population [1,7,8]. Access to care is through either outpatient TB treatment facilities, typically located in primary health care units throughout the country and referred to as TB cabinets, or through inpatient

treatment in infectious hospitals in major cities of Armenia. In 2014, a team of WHO experts conducted an extensive review of the Armenian TB care system, recommending a strategy to shift TB care to a more primary health care focused one [9].

In 2014 the structure of TB care system underwent a major change. The financing mechanism for inpatient TB facilities was changed from fee per bed/day financing to a mixed type that includes facility maintenance (fixed) costs and variable costs (drugs, medicine and food). As a result, inpatient TB facilities received fixed funds to maintain facility functions as well as variable costs for each patient admitted to the hospital. This new financing mechanism was aimed to eliminate perverse incentives for long hospitalizations of patients. Reform also introduced admission and discharge criteria for inpatient facilities. However, TB cabinets continued to be financed through a per-capita mechanism, resulting in sustained excessive referral rates to inpatient facilities [10–12].

For the above-mentioned reasons, there is a need to further revise Armenia's TB programme in line with WHO recommendations by expanding patient-centered approaches to strengthen outpatient services to improve TB detection and treatment adherence in Armenia [9].

The aim of this study was to assess the changes in the national TB programme in Armenia since the introduction of the 2014 reform. The specific objectives were to:

1) Compare the referral, diagnosis, and hospitalization of all presumptive TB cases registered in 2011 and 2017;
2) Compare inpatient vs outpatient public spending for TB treatment in 2011 and 2017;

3) Compare the number of hospitalized patients from 2013 to 2017;
4) Compare the average hospital length of stay in 2011 and 2017.

Methodology

Design

The study utilized an observational retrospective cross-sectional study design through self-administered survey technique as well as secondary data analysis.

Setting

Armenia is a landlocked country in the South Caucasus at the crossroads of Europe and Asia and a part of the European Region of the WHO. Armenia's population of approximately 2.9 million people reside in 11 administrative provinces. From a financial perspective, Armenia is classified by the World Bank as an upper middle-income country, with a GDP of 10.55 billion dollars in 2016 [13].

TB care in Armenia is its own division of the health system, targeting only TB patients and presumptive TB cases. Figure 1 presents the current structure of TB care in Armenia. The lead agency is the National TB Programme (NTP) of the Ministry of Health (MoH) and under its supervision are TB inpatient and outpatient units, penitentiary sector hospitals, a sanatorium, and the National Reference Laboratory (NRL). In 2011, there were 72 outpatient facilities serving the 11 administrative regions of Armenia. The 2014 reforms resulted into a consolidation of the TB treatment facilities and the number of outpatient units was reduced to 59 [11]. These outpatient facilities vary widely in the size of population covered, population

Figure 1. Structure of the TB care system in Armenia.
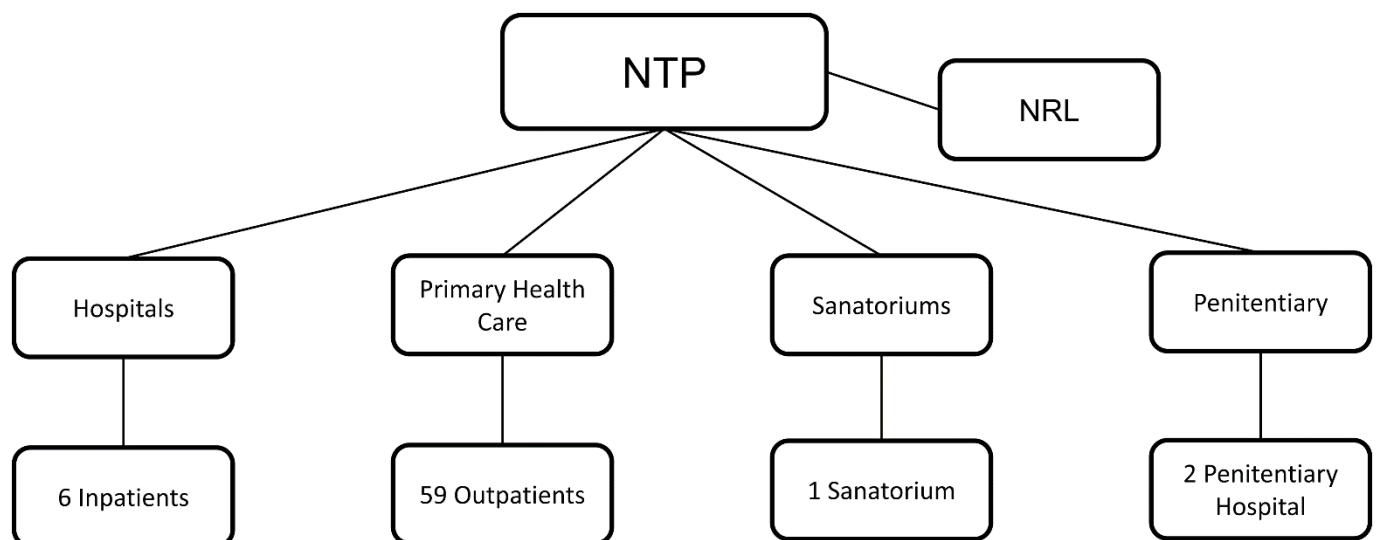
demographics, staffing levels, and the availability of onsite direct sputum smear microscopy. However, any outpatient unit lacking onsite direct sputum smear microscopy has access to nearby laboratories to perform diagnostic tests and confirm TB diagnoses. Accordingly, TB diagnosis and care is universally available through outpatient and inpatient services in compliance with the Directly Observed Treatment Short course (DOTS) strategy and TB management follows WHO guidelines.

Data collection, sources and statistical analysis

Data was collected through a questionnaire adapted from the routine monitoring and evaluation questionnaire which was sent to all outpatient TB cabinets, and archival data was drawn from the national TB programme database. Financial data was obtained from the State Health Agency of the MoH, the single public purchaser of services in Armenia. Statistical analyses were conducted using SPSS statistical software Version 25.0. (IBM Corp. Armonk, NY, USA)

Basic descriptive statistics (means, medians, standard deviations, frequencies) were used to compare means and z tests were used to assess confidence interval proportions of independent variables. Public spending per day of hospitalization and per visit to outpatient clinic were calculated by dividing overall actual expenditure amount by number of occupied bed/days and total visits to outpatient facilities respectively. Average exchange rates of the respective years were used for calculation of USD (United States Dollar) equivalents provided by the Central Bank of Armenia.
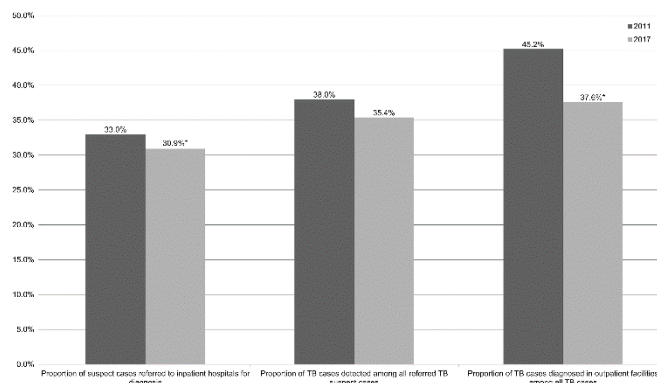
Ethical approval

Ethical Approval was acquired from the National Genetics Center's Institutional Review Board (IRB) in Yerevan, Armenia.

Results
Referral, diagnosis, and hospitalization for all presumptive TB cases registered in 2011 and 2017

Figure 2. Comparison of referral and hospitalization of TB cases in Armenia before (2011) and after (2017).

* Indicates statistically significant differences in proportions.

During 2017, the total number of TB cases registered in outpatient TB facilities was 901. Of these 901 TB cases, 345 (38.3%) were diagnosed in outpatient TB facilities, and 556 (61.7%) were diagnosed in inpatient TB facilities. Further, 946 presumptive TB cases were referred to inpatient facilities for diagnostic purposes. Among the referred presumptive TB cases, 764 (84.8%) started their treatments at the referral hospital. Only 137 (15.2%) cases started their treatment at the outpatient TB cabinets.

Further, in 2017 there were a total of 1,560 hospitalizations for TB or presumptive TB cases, the majority of which were smear negative at admission (995, 63.8%). The total number of hospitalizations is higher than the total number of TB cases in 2017 because it includes admissions after which TB diagnosis was not confirmed, as well as readmissions which were counted separately. Of those hospitalized, 325 were pulmonary DR-TB cases and 15 were extra-pulmonary DR-TB cases, and finally 31 were XDR-TB cases.

As per Figure 2 and Table 1, the comparison of the data from 2011 and 2017 revealed a minor difference (2.1%) in the proportion of presumptive TB cases referred to inpatient facilities for diagnosis, however the observed difference was statistically significant (p <

Table 1. Referral and hospitalization of TB cases in Armenia before (2011) and after (2017).

	2011 N	2017 N
Total number of presumptive TB cases	4389	3063
Number of referred presumptive TB cases	1450	946
Number of detected TB cases among referred presumptive TB cases	551	335
Number of TB cases diagnosed in outpatient facilities	527	343
Total number of TB cases	1165	901

0.05). Similarly, as per figure 2 and table 1, the proportion of TB cases detected among all referred presumptive cases decreased by 2.6% (p = 0.198). Finally, the proportion of TB cases diagnosed in outpatient facilities decreased by 7.6%, also statistically significant (p < 0.001).

Inpatient vs outpatient public spending for TB treatment in 2011 and 2017

Figure 3a illustrates the difference in public spending for 2011 and 2017. The spending for one visit to an outpatient TB cabinet remained almost the same, at 4.28 USD (1,600 AMD, Armenian Dram) and 4.30 USD (2064 AMD) respectively. However, the spending for one day of hospitalization in inpatient TB facilities has increased from 23.90 USD (8,900 AMD) in 2011 to 37.93 USD (18,308 AMD) in 2017.

Number of hospitalized patients from 2013 to 2017

As can be seen in Figure 3b, hospitalizations declined from 6,513 in 2013 to 1,560 in 2017, a decrease of 76%.

Figure 3. (a) Comparison of public spending on inpatient and outpatient TB care in Armenia before (2011) and after (2017) **(b).** Number of hospitalized cases in Armenia from 2013 to 2017.
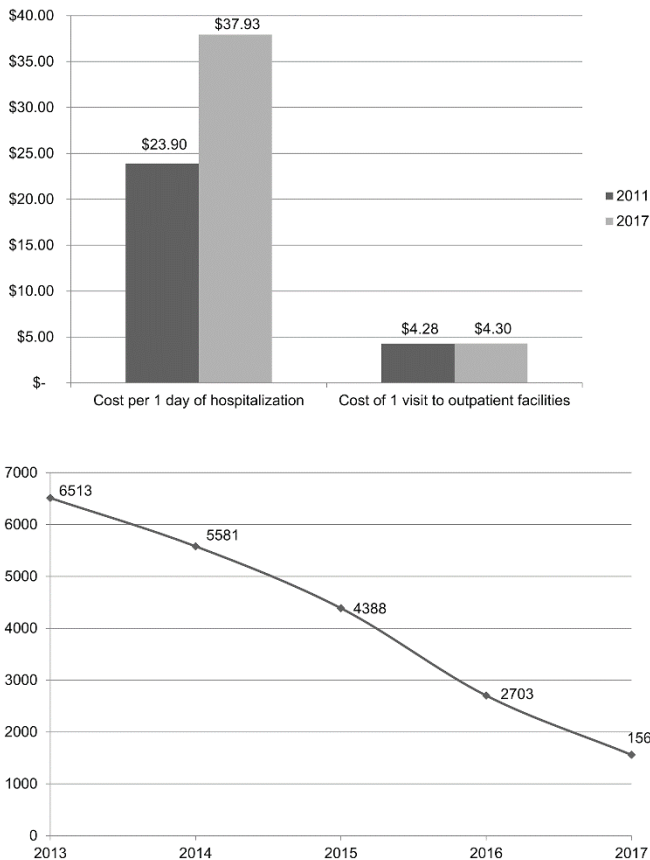
Average hospital length of stay

While precise numbers from before 2014 are not available, hospital stays for TB prior to the financial reform were typically in excess of 55 days [12]. The average duration of hospitalizations for TB in 2017 dropped to 37 days, a decrease of nearly 33%.

Discussion

Several salient trends have emerged as a result of the Armenian National TB Programme reform, with other aspects of the reforms in need of further analysis. The financial reform and structural changes that took place in Armenia in 2014, intended to reduce unnecessary hospitalizations, appear to have been very successful. Despite this excellent outcome, results indicate the proportion (63.8%) of smear negative hospitalized cases in 2017 remain startlingly high.

The significant reduction (7.6%) in the proportion of TB cases diagnosed in outpatient facilities indicates these units are being underutilized. This is particularly problematic as their primary purpose is to detect and prevent the spread of TB throughout Armenia, simultaneously reducing unnecessary hospitalizations. However, our findings indicate that 30.9% of the presumptive TB cases are still referred to inpatient facilities, only a minimal decrease (2.1%) since the reform was implemented. Furthermore, there seems to be no meaningful difference in referral practices to inpatient facilities of diagnosed TB cases.

The reforms do seem to have reduced the number of TB cases, declining by 38.8% from 2013 to 2017. Similarly, there is a 76% decrease in the absolute number of hospitalizations for the same period, also likely contributed to by the financial reform.

Of particular note is the observed reduction in the average length of stay from more than 55 days prior to the reform to 37 in 2017. This is an early indication that the reform of 2014 is already having some impact on previous iatrogenic incentives that were encouraging unnecessary hospitalizations [8,12].

While overall costs declined considerably, there was an increase in public spending per day of hospitalization. This increase is likely a result of changes in the financing mechanism, resulting in a decrease in the number of hospitalized patients, thus driving up relative per-day patient hospitalization costs.

As expected, the financial reform did not significantly impact public spending for visits to outpatient TB cabinets. The outpatient part of the system remains in need of similar reforms to that of the inpatient sector. For now, the change from a per-capita payment mechanism and the introduction of a

performance-based payment mechanism would provide additional incentives, improves quality, and encourages outpatient care [14].

Another opportunity for system reform would be introducing partial hospitalizations, where patients attend the hospital during the day for treatment and return home at night, further reducing costs of hospitalizations.

As the first nationwide operational research carried out after the reform to assess the National TB Programme, this study found clear indications of positive changes resulting from the 2014 reforms on TB care in Armenia. However, there are a few study limitations. First, the ability to observe trends was somewhat hindered by limitations in availability of data for all years before and after the introduction of the reform. Second, during the study timeframe, post-2014 TB reform, other changes to TB care system management were implemented, potentially exacerbating the observed cumulative effect of the changes we observed. Further, the study has relied on data available from health facilities; however, we cannot eliminate potential bias during the original data collection process.

Conclusions

Our findings confirm that the changes resulted from the 2014 reforms were positive. The inpatient financing reforms have been successful. The authors suggest that the next step in further TB reform is to move upstream and address the abundance of unnecessary TB related hospitalizations by reforming the structure and financing mechanism of the outpatient sector. This will continue the comprehensive change within the system, building on recent successes, improving better patient outcomes and improve resources expenditure. Further, it is hoped that countries with similar TB care structures can learn from the experience of Armenia.

References
1. World Health Organization (2018) Global Tuberculosis Report 2018. WHO, Geneva, 2018. Available at: https://www.who.int/tb/publications/global_report/en/. Accessed 22 August 2018.
2. Floyd K, Wilkinson D, Gilks C (1997) Comparison of cost effectiveness of directly observed treatment (DOT) and conventionally delivered treatment for tuberculosis: experience from rural South Africa. BMJ 315: 1407–1411.
3. Pooran A, Pieterson E, Davids M, Theron G, Dheda K (2013) What is the cost of diagnosis and management of drug resistant tuberculosis in South Africa? PLoS One 8: e54587.
4. Gillini L, Davtyan K, Davtyan H, Hayrapetyan A, Khachatryan S, Centis R, D'Ambrosio L, Dara M, Migliori G B, Sotgiu G (2013) TB financing in East Europe promotes unnecessary hospital admissions: The case of Armenia. J Infect Dev Ctries 7: 289–292. doi: 10.3855/jidc.3396.
5. Stop TB Partnership (2015) The Paradigm Shift 2016-2020: Global plan to end TB. Stop TB Partnership, Geneva, 2015. Available at: http://www.stoptb.org/assets/documents/global/plan/GlobalPlanToEndTB_TheParadigmShift_2016-2020_StopTBPartnership.pdf Accessed: 22 August 2018.
6. National Tuberculosis Control Center (2017) Programmatic data of the Armenian Available: http://www.ntp.am/hy/2017-2/. Accessed: 22 August 2018.
7. Government of the Republic of Armenia (2004) Decree N-318 on the provision of free of charge medical services guaranteed by the government. Yerevan, Armenia. Available at: https://www.arlis.am. Accessed 22 August 2018. [Available in Armenian]
8. World Health Organization (2017) Country Data Armenia Financing for TB prevention, diagnosis and treatment. WHO, Geneva. Available at: https://extranet.who.int/sree/Reports?op=Replet&name=%2FWHO_HQ_Reports%2FG2%2FPROD%2FEXT%2FTBFinancingCountryProfile&ISO2=AM&outtype=html Accessed: 22 August 2018

9. Dara M, Boom M Van Den, Ghukasyan G, Mkrtchyan Z (2014) Extensive review of tuberculosis prevention, control and care in Armenia. Available: http://www.euro.who.int/__data/assets/pdf_file/0004/321952/ Extensive-review-TBC-prevention-control-care-Armenia-July-2014.pdf?ua=1. Accessed: 22 August 2018.

10. Government of the Republic of Armenia (2014) Order N-2488 on approval of contractual budgets and financing norms for medical organizations providing state guaranteed free of charge medical care and services within the framework of tuberculosis care programme. Yerevan, Armenia. Available at: https://www.arlis.am. Accessed 22 August 2018. [Available in Armenian]

11. Tsaturyan S, Hayrapetyan A (2016) Transforming the model of care for treating tuberculosis in the republic of Armenia. Eurohealth 22: 15–17.

12. Davtyan K, Hayrapetyan A, Dara M, Gillini L, Davtyan H, Centis R, D'Ambrosio L, Sotgiu G, Migliori G B (2015) Key role of tuberculosis services funding mechanisms in tuberculosis control and elimination. Eur Respir J 45: 289–291.

13. World bank (2017) World development indicators, country profile Armenia. Available: http://databank.worldbank.org/data/views/reports/reportwidge t.aspx?Report_Name=CountryProfile&Id=b450fd57&tbar=y &dd=y&inf=n&zm=n&country=ARM. Accessed: 22 August 2018.

14. Cashin C, Chi Y-L, Smith P, Borowitz M, Thomson S (2014) Paying for performance in health care, Berkshire: Open University Press 312 p.

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