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The Ukrainian SORT IT Course

Strategies for active detection of tuberculosis in Ukraine: Comparative effectiveness amongst key populations (2014-2018)

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Abstract

Introduction: Ukraine has gaps in Tuberculosis (TB) service coverage, especially in key populations (KPs). We compared effectiveness of three different strategies for active TB detection among KPs and their linkage to TB treatment during three time periods.

Methodology: The KPs included people who inject drugs (PWID), sex workers (SW), men who have sex with men (MSM) and groups at-risk of TB (ex-prisoners, Roma and homeless). The active case finding included decentralized symptom screening and specimen collection (2014, strategy-1), decentralized screening with patient referred for specimen collection (2015-2017, strategy-2) and strategy-2 plus GeneXpert (2018, strategy-3).

Results: In total 680,760 KPs were screened, of whom 68% were PWID. TB case detection per 100,000 populations was 1,191 in strategy-1, 302 in strategy-2, and 235 in strategy-3. The number needed to screen (NNS) to identify one case was respectively 84, 332, and 425. TB detection was highest among homeless (range: 1,839-2,297 per 100,000 population). The lowest detection was among the MSM and SW. Between 2014 and 2018, 82-94% of all diagnosed TB patients in KPs started TB treatment.

Conclusions: The active case finding in KPs increased detection of TB cases in Ukraine, and the majority of diagnosed KPs initiated TB treatment. Centralization of diagnosis reduced the effectiveness of TB screening. Each region in Ukraine should assess the composition and the needs of KPs which will allow for adoption of specific strategies to detect TB among KPs with high TB prevalence.

Key words: Tuberculosis; operational research; active tuberculosis case finding; Ukraine; key populations.

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Introduction

In 2017, the national TB programs diagnosed only 6.4 million TB cases of the estimated 10 million cases globally. This leaves a 36% gap in TB case detection translating into 4.1 million "missed" TB cases. The missed cases included those who might have been undiagnosed or diagnosed in the laboratory but never initiated treatment [1]. A considerable contribution to missed cases is likely to be among the key populations with higher risks of TB exposure and infection and limited access to healthcare services compared to the general population [2,3].

Two of the three targets set by the World Health Organization's (WHO) Global Plan to End TB are to ensure that 90% of all TB cases worldwide are detected and placed on treatment and 90% of those detected achieve treatment success. These targets are inclusive of the key populations; therefore better coverage and equity of TB services targeting these groups are urgently needed [4].

In 2016, Ukraine was among the top ten high-burden MDR-TB countries and among the top ten countries that accounted for the 75% gap between the estimated drug-resistant TB incident cases and those enrolled on treatment [5]. This is an indicator of TB service coverage gaps, which are accentuated in key populations because of legal barriers, social exclusion, marginalization and discrimination.

The Ministry of Health of Ukraine had been conducting active case finding strategy in the general population for many years, which included only an X-ray examination. However, this practice has been stopped in July 2018. The approach to key populations

has been left to regions as part of the Ukraine's decentralized health system.

Previous studies have shown the usefulness of symptom-based screening for TB detection in children and HIV patients [6,7]. However, the increase of identified TB cases among key populations, which are often marginalized, has never been studied in Ukraine.

To address the lack of identification of TB case detection among key populations, the International Charitable Foundation Alliance for Public Health (APH) in Ukraine implemented three different active TB detection strategies among certain key populations between 2014 and 2018.

The first strategy included TB symptom-based screening and on-site sputum collection for smear microscopy (2014). The second strategy included the same symptom-based screening, but there was no on-site sputum collection, and patients with presumptive TB were referred to healthcare facilities for a smear microscopy (2015 to 2017). In this strategy, for homeless, ex-prisoners and Roma, an incentive food package was provided to go through the examination process. The third strategy started in 2018 and also included the symptom-based screening and referral to healthcare facilities for smear microscopy and GeneXpert.

We aimed to compare effectiveness of these three active TB detection strategies and linkage to TB treatment among key populations between January 2014 and June 2018 in Ukraine. This was done by comparing the Numbers Needed to Screen (NNS) to detect one TB case and the ratio in TB notification per active case finding strategy. The findings from the study should be useful to inform and guide targeted operation strategies for key populations.

Methodology

Study design

A cross-sectional study using routine program data on key populations in Ukraine.

General setting

Ukraine is a country in Eastern Europe with a population approximately 42 million according to the State Statistics Committee of Ukraine. The country consists of 27 regions with different geographical, infrastructural and socioeconomic profiles [8].

Table 1. TB detection strategies implemented in Ukraine, 2014-2018.

Strategy	Period	Client	Strategy used for TB detection
1	2014	PWID SW MSM	- Monthly symptom screening for clients in 18 regions - Sputum collection on site by TB nurse - Consulting examination by TB doctor - Minimum TB diagnostic package (sputum containers, masks for clients, X-ray film) provided and printed information materials distributed
2	2015-2017	PWID SW MSM Homeless Ex-prisoners Roma	- PWID, SW and MSM: o Yearly screening for clients in all 27 regions with referrals to PHC/TB outpatient center - Homeless, Ex-prisoners, Roma: o Yearly screening for clients in all 27 regions o Social worker provided support for reaching to the PHC/TB outpatient center o Incentive food package was provided to go through the examination process
3	January-June 2018	PWID SW MSM Homeless Ex-prisoners Roma	- PWID, SW and MSM o Yearly screening for clients used in 25 regions with referrals to PHC/TB outpatient center and bonus provided to social worker for support of 30% of clients who otherwise do not reach the PHC/TB outpatient center o Bonus to social worker for each detected TB case o Bonus to medical service providers for lab diagnostic support o GeneXpert - Homeless, Ex-prisoners, Roma o Yearly screening for clients in 25 regions and 4 regions for Roma only o Social worker provided support for reaching to the PHC/TB outpatient center, o Bonus to social worker for each detected TB case o Bonus to medical service providers for lab diagnostic support of GeneXpert and/or microscopy

TB: tuberculosis, PWID: people who inject drugs, SW: sex workers, MSM: men who have sex with men.

TB response

The Ministry of Health of Ukraine provides overall organizational and technical guidance for health care services to TB patients including those with HIV co-infection. TB control services are implemented by the National TB Program (NTP) of Ukraine. The services of the NTP include TB outpatient centers, TB hospitals for adults and children, and TB counseling rooms in outpatient medical facilities. Presumptive TB cases are detected in primary healthcare (PHC) institutions throughout the country. Until mid-2018, the main method of TB detection was routine X-ray examinations and passive case finding among people who seek health services.

Since 2004, APH has been one of the Principal Recipients of the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM). Its activities include supporting communities in the response to HIV/AIDS and TB, preventing the spread of HIV and related epidemics, strengthening health systems and building the capacity of key populations to engage in care activities. Every year, APH together with its partner organizations, covers over 250,000 members of the population most vulnerable to HIV (including PWID, MSM, sex workers) by prevention programs [9]. In 2014, the active TB screening was implemented in 18 regions, while between 2015 and 2018 this was offered in all 27 regions of Ukraine. Table 1 summarizes the clients, time periods and strategies used for case finding for each of the three strategies implemented between 2014 and 2018.

Study population

The study key population included clients of harm reduction programs such as people who inject drugs (PWID), sex workers (SW), men who have sex with men (MSM) and groups at risk of TB (ex-prisoners, Roma population and homeless) (Table 2).

Study definitions

A person with presumptive pulmonary tuberculosis (TB) is defined as someone with an unexplained cough for > 2 week or with or at least one other TB symptom out symptoms recommended by WHO for screening [10]. A detected TB case was defined as person with TB confirmed by laboratory (sputum smear/culture) examination or diagnosed clinically by a TB doctor.

Data and statistical analysis

Data were extracted from the APH electronic register for key population (SyrEx 2x). To compare 2014 (strategy 1), 2015-2017 (strategy 2) and 2018 (strategy 3) the following variables were included: key population type; numbers screened for TB; numbers detected with TB; numbers initiated on TB treatment, and the number needed to screen (NNS) to detect one TB case.

The NNS to detect one TB case was derived by dividing the total numbers screened by total numbers of detected TB cases. The numbers of detected TB cases were standardized to 100,000 population to allow comparison with the notification rate in the general population.

Ethics

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

Results

In total 680,760 members of key populations were screened during the 4.5 years. PWID comprised the highest proportion (67.9%) among the total screened population.

Under the Strategy 1, the NNS in key populations to identify one TB case was 84. The NNS increased 3.4 times Strategy 1 in 2015 and 5.2 times Strategy 1 in 2017 ($p < 0.05$) indicating drop in effectiveness of

Table 2. The description of key populations included in the active TB screening in Ukraine, 2014-2018.

Key population	Description
People who inject drugs	People who regularly inject narcotic drugs with non-therapeutic purposes
Sex workers	Women/men (or transgender people), who receive money or goods for providing sex services (on a regular or irregular basis)
Men who have sex with men	Men who practice sexual contacts (oral or anal) with other men
Roma	People an ethnic minority population who live in many countries of Europe, Western and South Asia as well as in North Africa, North and South America and Australia
Homeless	People who have no homes. Homelessness may be chronic or temporary, voluntary or forced
Ex-prisoners	People who are people released from places of confinement, who stayed out of prisons for 2 years

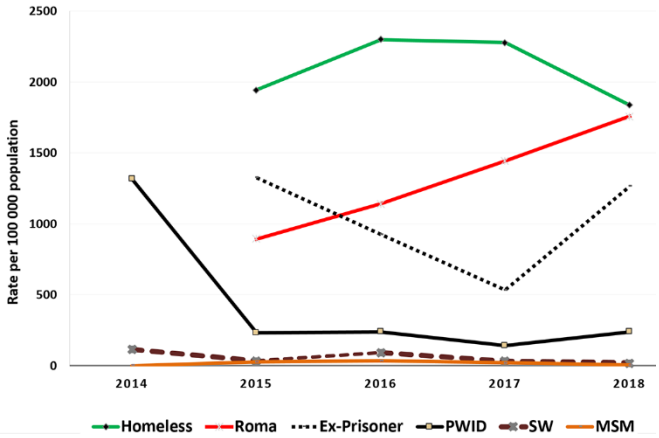
Strategy 2 when key populations were referred to smear microscopy at health facilities. The effectiveness remained low in Strategy 3 where the NNS became 5.1 times higher ($p < 0.05$) than that in 2014. At the same time, 82-94% of all diagnosed TB patients in key populations between 2014 and 2018 successfully initiated TB treatment (Table 3).

Of all key population groups, the highest detection of TB from screening was among homeless people, ranging from 1,839 to 2,297 per 100,000 screened population. In 2014, this group was not included in the active case finding activities. The lowest detection was observed in the MSM group (from 0 to 34 per 100,000 screened). A steep increase by 137% ($p < 0.05$) was seen for ex-prisoners in 2018 (Figure 1).

During the same 2018 year, about 90% of all ex-prisoners had access to GeneXpert (Figure 2). The worst access to GeneXpert testing was for Roma population as only 4.9% of those who underwent diagnostic services were tested with GeneXpert. However, there was a progressive increase in screening in this group from 2015-2018.

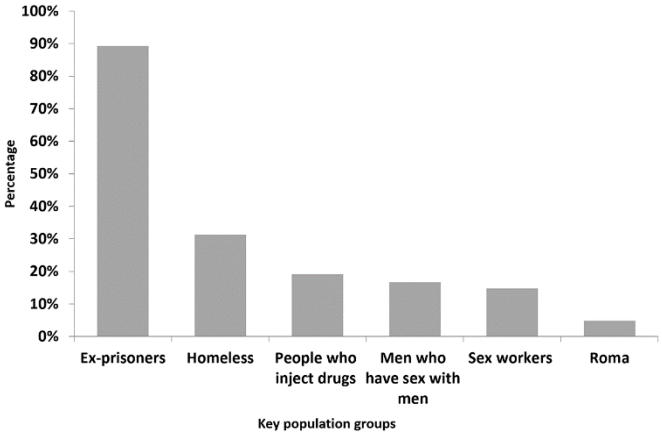
Differences in TB case detection per active case finding strategy are presented in the Table 4. The highest rate 1,191 per 100,000 screened key population was observed during 2014 under Strategy 1. It was 13 times higher than the TB notification in the general population for the same year. In the following years under Strategies 2 and 3 notification rates dropped significantly by three-fold to hover between 3 and 4 times that in the general population ($p < 0.05$).

Figure 1. Number of detected TB cases per 100,000 screened key population groups in Ukraine, 2014-2018.



TB = tuberculosis; PWID = people who inject drugs; SW = sex workers; MSM = men who have sex with men.

Figure 2. Proportion of presumptive TB cases who underwent diagnostics using GeneXpert in different key population groups in Ukraine, 2018.



Discussion

The findings of the study shed light on specific needs and requirements of the key population for TB control in Ukraine. The comparisons of strategies, used in Ukraine confirm that the active detection is effective, which is consistent with findings from global literature and the experiences in other countries.

Among the three strategies used, the NNS to detect one TB case was the highest (13 times higher than in the general population) when screening and sputum collection components were decentralized. The NNS dropped by 4-fold when the sputum collection component of TB diagnosis was centralized - requiring patients to present to health facilities. The NNS did not improve even on addition of GeneXpert at centralized sites perhaps because patients never managed to get there. This suggests that centralization of components of TB diagnosis adds hurdles for patients, and they drop out of the "journey to TB diagnosis".

Table 3. Number needed to screen to detect one TB case and linkage to TB treatment among key populations using different active case finding strategies in Ukraine, 2014-2018.

	Strategy 1	Strategy 2			Strategy 3
	2014	**2015**	**2016**	**2017**	**2018**
Population screened	43,087	159,053	161,556	167,823	149,241
Diagnosed with TB	513	559	528	386	351
NNS[a]	84	285	306	435	425
Started TB Treatment	419 (82%)	488 (87%)	486 (92%)	363 (94%)	326 (93%)

[a] NNS - Number Needed to Screen to detect one TB case.

Table 4. Increase in detection of TB cases while using different active case finding strategies in targeted key populations in Ukraine, 2014-2018.

	Strategy 1	Strategy 2			Strategy 3
	2014	**2015**	**2016**	**2017**	**2018**
TB notification rate[a] per active case finding strategy	1,191	351	327	230	235
TB notification rate[a] in the general population	90	79	77	71	71[b]
Times in increase of notification by active case finding	× 13	× 4	× 4	× 3	× 3

[a] Per 100,000 population; [b] data of 2017.

TB notification rates using all three "active" case finding strategies are higher than the rates using "passive" case finding in the general population. However, centralization of components of TB diagnostics chain when patients are referred to heath facility for sputum collection leads to significant decline in diagnosed TB cases. Active case finding is thus worthwhile as it is effective in detecting TB in key population groups and should be expanded.

The addition of GeneXpert in central health facilities did not contribute to overall TB detection, which means that it is not simply the availability of new TB diagnostic tools that is important but where you place them. Importantly, patients need to be able to access these diagnostic tools and it would seem logical to decentralize them closer to patient sites.

As mentioned earlier, Ukraine has stopped mass TB screening as of July 2018, leaving only the symptomatic screening. Ukraine's new approach is to allow each of the 27 regional authorities to decide how to plan strategies for identification of key populations as part the Ukraine's decentralized health system. It is reassuring that over 80% of all those diagnosed with TB initiated TB treatment. Key populations thus will initiate TB treatment if the upstream hurdle of diagnosing their TB is overcome within regional strategies.

Our findings indicate that final two strategies were effective with homeless people, as the number of detected TB cases in this population was the highest. However, the offer of a food package incentive is needed, as our findings showed that the number of detected cases dropped when this incentive was discontinued in 2018. This should also require least resources due to the higher incidence of TB, allowing for much smaller number of screenings to identify those with TB. For PWID under strategy 1, the health worker outreach and on site follow up proved to be the most effective as when on-site sputum collection was discontinued under strategy 2 the numbers of detected cases also dropped. In the Roma population, there has been no change in type of approach within all three strategies, however detection and follow up has been steadily raising over the years of the study. This may be due to specific social services that are provided to Roma by Roma specific outreach workers and their being geographically confined in specific regions. The ex-prisoner group had an unexpected increase in detection since they had most access to GeneXpert diagnostics. This may be due to its targeted use with this group, but we do not have any specific explanation for these findings. The findings from other key population groups, such as MSM and SW demonstrate almost no difference in very low detection under all three strategies. This shows lack of understanding of the specific needs, such as lack of use of social media to reach MSM and/or lack of interaction with SW in the evenings or nights. It is also hard to make any linkages in TB detection with HIV co-infection for this group. Finally, there is an indication that paying social workers to reach the key populations increases the detection rates. Our findings have sufficient breath of coverage of the entire country to help each region to assess the best options to adopt the strategy most suitable to their needs and circumstance.

The limitations of this study are that some of the key populations may have mis-represented their potential symptoms to avoid additional diagnostics, even if there were incentives to get them involved. Also, the use of GeneXpert in Ukraine is not widely practiced for screening due to its price. It is mainly used to confirm the type of TB, and this may have made the assessment of GeneXpert effectiveness in strategy 3 limited. Another limitation is that comparison of the strategies covers three different time periods where we observe cumulative effect of all possible factors influencing TB detection and notification and not solely results of interventions done by screening projects.

Conclusion

The active case finding in key populations increases detection of TB cases and reassuringly, the majority of those who are diagnosed initiated TB treatment. Asking patients to present to health facilities to provide sputum for TB diagnosis compromises the effectiveness of the active case finding strategy by three-fold or more. Each region in Ukraine should assess the composition and the needs of key populations, which will allow for adoption

of specific strategies. The homeless and PWID should be prioritized in all the regions, to allow for most cost-effective TB detection and follow up. Integration of social services and health services should also be crucial for these two groups to ensure the most effective strategy. Innovative ways of decentralizing diagnosis and treatment to these populations and provide required resources would be important for scaling up TB control in Ukraine.

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