

## Integration of HIV testing in tuberculosis drug resistance surveillance in Kazakhstan and Kenya

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### SUMMARY

In Kenya and Kazakhstan, integration of human immunodeficiency virus (HIV) testing results into the routine surveillance of multidrug-resistant tuberculosis (MDR-TB) proved feasible and useful. The integration process improved overall data quality and data validation capacity, and integrated data are a useful addition to routine cohort and treatment outcome data. Besides their importance for individual patient care, they provide

trends on the association of MDR-TB and HIV in the routine programme setting. They also form a useful epidemiological basis for more specific studies, such as on nosocomial outbreaks. Whether the system itself is sensitive enough to monitor possible outbreaks needs further investigation.

**KEY WORDS:** TB; HIV; drug resistance; Kazakhstan; Kenya

SEVERAL STUDIES have shown a positive association between drug-resistant (DR) tuberculosis (TB) and the human immunodeficiency virus (HIV) during outbreaks in some nosocomial and other congregate settings, but not all.<sup>1,2</sup> Linked surveillance of HIV and DR-TB will allow trends of HIV-associated DR-TB to be monitored among all patients. Lack of collaboration between HIV and TB programmes, resulting in unresolved issues such as logistics, stigma, ethical issues around anonymous unlinked HIV testing in surveillance, and lack of agreement about the diagnostic tests and algorithms for HIV testing, has prevented this from happening.<sup>3-5</sup> The rapid scale-up of routine HIV testing provides opportunities for linked surveillance. We explored how best to do this under different programmatic conditions in two different epidemiological settings: Kenya, which has high HIV prevalence and a relatively low rate of multidrug-resistant TB (MDR-TB, defined as resistance to at least isoniazid and rifampicin), and Kazakhstan, which has high MDR-TB prevalence and a lesser, but growing, HIV problem. We describe the set-up and development of the two country-tailored systems and compare findings between the countries.

### PROJECT IMPLEMENTATION AND RESULTS

In both Kazakhstan and Kenya, the collection of DR-TB and HIV parameters was assessed to decide

how HIV data could best be integrated into DR-TB surveillance.

As the project involved the integration of routine systems, no ethical clearance was needed.

#### *Kazakhstan*

In Kazakhstan, drug susceptibility testing (DST) and HIV testing are routinely implemented nationwide for all TB cases. The national electronic TB register covers all treated patients. However, validation of electronically reported HIV data in terms of completeness and reliability had not been performed earlier, as the Ministry of Health relied on the Republican AIDS Centre for TB-HIV data and on the laboratory for DR-TB data.

We first evaluated the national electronic register for completeness, focusing on HIV and DST results. Monthly notifications of errors and missing values were sent to the 16 regional TB dispensaries with a request for corrections, which improved data completeness. The proportion of patients without a recorded HIV test result decreased from 11.5% to 3.6% between March 2009 and March 2010. In the same period, the proportion of all culture-positive cases without DST results recorded decreased from 32.3% to 7.2%. Monitoring in two regions revealed that about half of the missing DST results could be explained by a failure to test the patient, and the other half by a failure to adequately record available

results. Missing HIV tests results were also due to failure to enter them in the database.

### Kenya

In Kenya, HIV testing is routinely offered to all TB cases, with 88% coverage in 2009. DST is routinely performed for retreatment patients only, with coverage reaching 61% in 2009. HIV indicators are integrated into the national TB monitoring system and are routinely reported for all patients, from district up to national level.

DST results are reported via the national central reference laboratory (CRL) system. As data on HIV testing were not linked into this system, as a first step, the CRL culture request form was adapted to include HIV status and introduced on 1 January 2009. CRL staff introduced the project in all provinces, and proactively followed up with health facilities when request forms were inadequately completed. Coverage of HIV status in the CRL database improved noticeably during the project, reaching 55% in December 2009. Before data analysis, a final request to update records was made to all provincial TB coordinators, resulting in a final coverage of HIV status among retreatment patients of 74%. All samples submitted were cultured, and for all those with positive growth DST results were available.

### Challenges during project implementation

A major challenge for project implementation in Kazakhstan was that most regional TB centres needed on-the-job training to identify missing values and potential errors themselves. Feedback in the form of a quarterly data validation exercise on missing values and errors was provided (e.g., a patient registered as HIV-negative but on antiretroviral treatment). Rigorous follow-up encouraged lower-level TB centres to make corrections. A positive consequence was subsequent extension of data validation to cover additional parameters improving completeness and reliability of the whole database.

In Kenya, the main challenge faced during project implementation was the need for nationwide sensitisation of health care workers to the updated culture request form and continued focused supervision of the appropriate use of the form. In addition, the electronic data capture tool needed to be adapted to incorporate the modifications, which took time.

### Data collected

The data collected in this project on retreatment cases (Table) are in line with available data from both countries. HIV prevalence is much higher among retreatment cases in Kenya than in Kazakhstan (50% vs. 1%), while MDR-TB prevalence is much higher in Kazakhstan than in Kenya (43% vs. 7%). Interestingly, in both countries the distribution of treatment history was similar: in both countries relapse cases, smear-negative and smear-positive combined, made

**Table** Overview of linked routine surveillance data for HIV and drug resistance in retreatment cases in Kazakhstan and Kenya

	Kazakhstan 2007–2009	Kenya 2009
<b>Background data</b>		
New patients reported countrywide, <i>n</i>	55 480	99 354
Notification rates of new patients, per 100 000	118	294
Retreatment patients reported countrywide, <i>n</i>	27 127	10 675
Notification rates of retreatment patients, per 100 000	58	32
<b>Patient characteristics</b>		
Male sex, %	69.9	65.0
Age, years, mean (SD)	40.7 (14.5)	36.3 (12.5)
<b>Treatment history, %</b>		
Failure	11.8	12.4
Sputum smear-negative relapse	33.4	34.1
Sputum smear-positive relapse	37.8	37.0
Default	16.9	16.4
Data missing	0.0	13.7
<b>Culture and DST results, %</b>		
No culture growth overall	45.3	64.0
No culture growth among smear-negatives	75.7	87.4
No culture growth among smear-positives	26.6	23.2
DST result (for those with culture growth)	90.1	100.0
<b>For those with DST results, %</b>		
Pan-susceptible	33.5	75.3
Monoresistant	7.3	14.4
Polyresistant	15.9	3.5
MDR-TB	43.4	6.8
<b>HIV testing results, %</b>		
With HIV test result	96.9	65.6
HIV+ (of those tested)	1.2	49.9
<b>HIV and drug resistance results, %</b>		
HIV+ with MDR-TB	54.8	4.7
HIV- with MDR-TB	56.8	8.3
MDR-TB patients who are HIV+, %	1.4	31.3
Non-MDR-TB patients who are HIV+, %	1.5	45.2

HIV = human immunodeficiency virus; SD = standard deviation; DST = drug susceptibility testing; + = positive; - = negative; MDR-TB = multidrug-resistant tuberculosis.

up about two thirds of all retreatment cases. Both countries had a high percentage of cultures that did not grow (Kazakhstan 45% and Kenya 64%). This was related to smear results, with 76–87% of smear-negative and 23–26% of smear-positive cases being culture-negative. Potential reasons are transportation delay, patients started on retreatment before a sputum sample is taken for culture, dilemmas with decontamination or other laboratory conditions, or patients being incorrectly diagnosed as having TB based on clinical features and X-ray findings. The high percentage of cultures without growth urgently warrants further investigations.

### CONCLUSION

In both Kazakhstan and Kenya, the integration of activities contributed to a critical review of the

processes of data collection and reporting for MDR-TB and HIV testing, which improved data quality. Rigorous follow-up at the facility level improved data completion. Useful feedback after data provision by the peripheral levels was an important motivation for completing data in both countries. The electronic-based recording and reporting system in Kazakhstan facilitated feedback on missing values and errors to the peripheral level for correction. A high-quality countrywide routine surveillance system of drug resistance and HIV testing could reduce the need for costly drug resistance surveys and HIV indicator surveys, although they remain valuable for examining specific research questions.

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**R É S U M É**

Au Kenya et au Kazakhstan, nous avons intégré les résultats du test du virus de l'immunodéficience humaine (VIH) dans la surveillance de routine de la tuberculose multirésistante (TB-MDR), ce qui s'est avéré réalisable et utile. Le processus d'intégration a amélioré la qualité globale des données et la capacité de validation des données, et les données intégrées constituent une addition utile aux données de la cohorte et des résultats du traitement. A côté de leur importance pour les soins indi-

viduels, elles mettent en évidence les tendances des relations entre la TB-MDR et le VIH dans le contexte d'un programme de routine. Elles constituent également une base épidémiologique utile à des études plus spécifiques, comme par exemple les mini-épidémies nosocomiales. Des investigations complémentaires s'imposent pour déterminer si le système lui-même est suffisamment sensible pour la surveillance de mini-épidémies possibles.

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**R E S U M E N**

En Kenia y Kazakstán se demostró que es factible y útil integrar los resultados de la detección de la infección por el virus de la inmunodeficiencia humana (VIH) a las pruebas corrientes de seguimiento de los casos de tuberculosis multidrogorresistente (TB-MDR). Con esta integración se mejoró globalmente la calidad de los datos y la capacidad de validación de los mismos; los datos integrados representan una contribución útil a los datos sistemáticos de las cohortes y de los desenlaces terapéu-

ticos. Además de su importancia en el tratamiento individual del paciente, los datos integrados ofrecen información sobre las tendencias de la relación de la infección por el VIH y la TB-MDR en el marco del programa. Estos datos constituyen asimismo un fundamento epidemiológico adecuado para estudios más específicos, por ejemplo sobre los brotes epidémicos intrahospitalarios. La sensibilidad de este sistema en la vigilancia de los posibles brotes requiere mayor investigación.

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