# EXPERIENCE WITH FIGHT AGAINST TUBERCULOSIS IN THE VERKNEVILYUYSKY REGION OF THE SAKHA REPUBLIC (YAKUTIA) UNDER CURRENT SOCIAL AND EPIDEMIOLOGICAL CONDITIONS

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**Summary**.
Analysis of 10-year tuberculosis control activities in the setting of one of rural agricultural regions in extreme north demonstrates that significant successes leading to considerable reduction in epidemiologic indicators for tuberculosis could be achieved by well-organized program regulating multifaceted interaction between municipal institutions, healthcare facilities, agencies and the leading all-republic specialized anti-tuberculosis institution. Improvements in epidemiologic situation are apparent from significantly decreased infection levels and tuberculosis incidence rates among children and adolescents.

**Keywords**: tuberculosis, epidemiology, incidence, morbidity, bacillary-positive cases, infection level, rural area, prevention, treatment for tuberculosis, organization of tuberculosis control

Verknevilyuysky region is a typical rural region of Sakha Republic (Yakutia), with aboriginal Yakut population of 21.400.

As of January 1, 2002, epidemiological situation for tuberculosis (TB) in the Verknevilyuysky region was estimated as highly difficult: key epidemiological rates of TB in the region by far exceeded the same rates for other regions in the republic and were higher than average all-republic rates by a factor of 2 to 2.5 (Table 1).

Table 1

Key epidemiological rates for tuberculosis in the Sakha Republic (Yakutia) and in the Verknevilyuysky region, as of January 1, 2002 (per 100,000 pop.)

| Rate | Territory | |
|---|---|---|
| | Sakha Republic (Yakutia) | Verknevilyuysky region |
| Incidence | 74.1 | 191.1 |
| Morbidity | 282.9 | 539.6 |
| Bacillary-positive cases | 94.6 | 214.6 |

Starting in 2002, the administration of Verknevilyuysky region has been taking emphasized measures for more intensified comprehensive efforts in the fight against TB, within the legal framework of Russian Federation and Sakha Republic (Yakutia) intended to protect the population from TB infection.

First of all, the main prerequisites for successful fight against TB were set up: good material and technical facilities, full-scale staffing and sufficient financing of TB control service.

Secondly, the Head of the Verknevilyuysky region, expressing his state political will, has organized the cooperative work between municipal bodies, health institutions, and the society. This provided a maximum fulfillment of the scope of anti-TB measures aimed at prevention, early

detection of TB, health examination of the population and hospitalization of TB patients.

Table 2

Population coverage with preventive measures for tuberculosis in 2004-2011

| Rates | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|
| Total coverage with occupational health examination | 80.4 | 74.3 | 81.1 | 73.3 | 75.4 | 73.6 | 71.4 | 65.7 |
| Coverage with tuberculin skin testing | 92.3 | 99.1 | 99.2 | 93.1 | 98.1 | 97.7 | 97.4 | 98.2 |
| Number of newly identified patients | 44 | 30 | 14 | 10 | 14 | 14 | 12 | 11 |
| Proportion of patients detected by occupational health examination | 81.8 | 73.3 | 78.6 | 80.6 | 50.0 | 50.0 | 50.0 | 36.4 |

Table 3

Preventive fluorographic examinations for tuberculosis in the rural population

| Year | Number of rural settlements | Population | Fluorographic examinations performed (persons) | % of coverage | Patients with TB detected |
|---|---|---|---|---|---|
| 2004 | 15 | 3028 | 2549 | 84.2 | 8 |
| 2006 | 17 | 6943 | 6070 | 87.4 | 4 |
| 2007 | 15 | 5812 | 4902 | 84.3 | 1 |
| 2008 | 12 | 4758 | 4192 | 88.1 | 2 |
| 2009 | 15 | 4615 | 4092 | 88.7 | 0 |
| 2010 | 6 | 2298 | 2031 | 86.0 | 0 |

Beginning in 2004, new “MEDYUG” portable digital fluorographs are used for fluorographic examinations.

Table 2 shows total coverage of the eligible population with occupational health examinations. Table 3 demonstrates achievement of maximum high population coverage rate with fluorographic

examinations in rural healthcare areas, owing to active cooperation between the administration of *naslegs* and local medical workers. A high TB detection rate by occupational health examinations is seen during the first two years, in the region on the whole and in rural healthcare areas. Starting in 2006 (the third year since comprehensive measures have been under way), the absolute number of new cases in rural healthcare areas has fallen abruptly, and those detected are minor forms of TB, which is an evidence for the effectiveness of preventive examinations.

Maximum attention was paid to effectiveness of clinical treatment and rehabilitation of the population cohorts with TB disease, as they were the source of TB infection.

As an infectious disease, TB has common regular patterns with other infectious diseases. General rules of successful action against infections are localization and eradication of the infection source. In the case of TB infection, "infection source localization" means hospitalization of patient cohorts to TB in-patient clinics, and "infection source eradication" means curing the patients of TB.

As a result of the strengthened comprehensive work with the above named regional administrative and healthcare institutions, coverage with hospitalizations was achieved in 100% of the active TB patient cohort, i.e. the source of TB infection was localized.

In this way, during the regional-level phase (phase I) of the comprehensive fight against TB, which consisted in setting up key prerequisites to and enabling cooperative work so that patients with active TB were completely covered with hospitalizations, we set up a serious foundation for successful realization of step II – a specialized phase of anti-TB work, aimed at radical improvement of the quality of work.

Phase II is a specialized part of anti-TB work and presents a huge scope of diagnostic, treatment, outpatient dispensary follow-up and consultation measures – greater part of this, and more complex part, is conducted in cooperation with the leading TB institution of the republic, the State Budgetary Institution of Sakha Republic (Yakutia) "Research-Practice Center 'Phthisiatry'" (Table 4).

It should be stressed that it is the cooperative specialized work that plays the crucial role in radically improving the quality of special care for TB patients from regions.

'Phthisiatry' Research-Practice Center is the base for a years-long, successfully functioning centralized system for controlling basic anti-TB activities: diagnosis, supervision of treatment effectiveness and treatment course correction, appointment for surgical treatment, supervision of the effectiveness of dispensary system for regular population health examinations. Under this centralized control system, any patient from any region of Sakha Republic has the opportunity to be completely cured of TB.

Intensive use of this centralized control system resulted in a huge amount of work that had been conducted cooperatively from 2002 to 2011 (Table 4): 1964 patients received specialist's consultation, 221 were treated in the clinical department of the 'Phthisiatry' Research-Practice Center, 119 underwent surgeries for TB, 123 were excluded from smear-positive follow-up groups, and 308 patients were cured of TB.

Such system of cooperative work provided a highly effective treatment and follow-up: the rates are presented in Table 5, showing that average rates of clinical cure for 2002-2010 were 44% in Verknevilyuysky region, 37.7% in Sakha Republic, and 29% in Russian Federation.

Intensive comprehensive efforts against TB resulted in radical reduction of key epidemiologic rates for TB achieved in the Verknevilyuysky region for the period from 2002 to 2011 (Table 6).

Absolute rates (Table 7) likewise indicate stabilization of TB infection in the Verknevilyuysky region. Yet stabilization in incidence among newly identified patients is seen starting in 2005, while rates among patients with active TB started to stabilize later, in 2008.

Table 7

Stabilization of TB infection in the Verknevilyuysky region (abs. n.)

| Rates | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|---|---|
| Total number of newly identified cases | 30 | 33 | 44 | 30 | 14 | 10 | 14 | 14 | 12 | 11 |
| Of them, children and adolescents | 13 | 8 | 11 | 6 | 2 | 4 | 1 | 3 | 1 | 1 |
| Population cohort with active TB | 131 | 114 | 95 | 90 | 72 | 56 | 41 | 37 | 37 | 35 |
| Of them, children and adolescents | 25 | 20 | 17 | 10 | 10 | 4 | 2 | 2 | 2 | 3 |
| Bacillary-positive population cohort | 67 | 41 | 30 | 32 | 22 | 22 | 19 | 17 | 24 | 18 |

In prospect, the fact that there is visible prognosis of healing children and adolescents of TB infection is an encouraging factor.

From 2002 to 2011 reduction had been achieved in:

-absolute numbers of children and adolescents with active forms of TB, down from 23 (2002) to 3 (2011), i.e. 7.7 times lower;

-TB infection in children, down from 12.0 to 6.8%, i.e. 1.7 times lower;

-TB infection in adolescents, down from 12.9 to 7.2%, i.e. 1.8 times lower;

-numbers of children at increased risk of TB disease, down from 402 to 124, i.e. 3.2 times lower;

-numbers of adolescents at increased risk of TB disease, down from 132 to 35, i.e. 3.8 times lower.

The proof for the above stated prognosis is the real reduction of TB infection source, i.e. numbers of bacillary-positive patients, from 67 to 18 (by a factor of 3.7) during the study period.

Thus, experience with fight against TB in the Verknevilyuysky region for the period from 2002 to 2011 conducted in cooperation with municipal bodies, health institutions and agencies, and the “Phthisiatry” Research-Practice Center, the leading republican specialized TB institution, demonstrated that TB is a controllable infection and that there is a real possibility to radically reduce key epidemiological rates for TB, and next, to heal the population of TB infection in any region of the Sakha Republic.

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Table 4

**Amounts of consultations, diagnostic procedures, clinical care, and dispensary patient follow-**

**up work, conducted in cooperation with the leading republican antituberculosis institution from 2002 to 2011**

| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of patients who received specialist's consultation in the "Phthisiatry" Research-Practice Center | 331 | 290 | 343 | 282 | 212 | 211 | 163 | 139 | 118 | 100 | 106 | 1964 |
| Coverage of the patient cohort with consultations (%) | 57.5 | 84.7 | 84.7 | 95.5 | 95.0 | 94.4 | 98.1 | 97.5 | 97.8 | 97.3 | 100.0 | 94.4 |
| Coverage of the patient cohort with clinical treatment at the "Phthisiatry" Research-Practice Center (%) | 5.3 | 22.9 | 30.7 | 29.5 | 27.7 | 27.7 | 23.2 | 39.0 | 26.7 | 67.6 | 47.2 | 221 |
| Clinical treatment of children and adolescents at the "Phthisiatry" Research-Practice Center | 34 | 25 | 29 | 20 | 26 | 28 | 22 | 12 | 15 | 10 | 9 | 186 |
| Patients who underwent surgeries in the Pulmonary Surgical Department of the "Phthisiatry" Research-Practice Center | 4 | 19 | 12 | 19 | 13 | 19 | 9 | 8 | 7 | 5 | 8 | 119 |
| Patients excluded from smear-positive follow-up groups | 12 | 18 | 9 | 21 | 15 | 23 | 10 | 6 | 7 | 6 | 8 | 123 |
| Clinically cured patients | 27 | 35 | 48 | 47 | 48 | 35 | 30 | 11 | 19 | 18 | 17 | 308 |

Table 5

**Effectiveness of clinical care and dispensary follow-up based on the rates of clinical cure in Verknevilyuysky region, Sakha Republic (Yakutia), and Russian Federation**

| Territory | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Average rate |
|---|---|---|---|---|---|---|---|---|---|---|
| Verknevilyuysky region | 28.5 | 41.2 | 49.4 | 53.3 | 48.6 | 53.6 | 25.5 | 45.9 | 49.0 | 44 |
| Sakha Republic (Yakutia) | 34.4 | 34.2 | 49.1 | 38.3 | 32.9 | 37.3 | 36.1 | 39.9 | 33.9 | 37.3 |
| Russian Federation | 19.3 | 21.4 | 39.4 | 28.7 | 30.1 | 31.0 | 31.9 | - | - | 29.0 |

Table 6

**Changes in key epidemiological rates for tuberculosis per 100,000 population**

| Rates, Territory | | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Incidence | Sakha-Yakutia | 86.9 | 75.5 | 84.9 | 75.6 | 72.9 | 65.7 | 69.1 | 67.1 | 68.2 | |
| | Verknevilyuysky | 137.0 | 152.8 | 207.1 | 141.5 | 65.9 | 47.0 | 62.9 | 64.3 | 55.8 | 51.2 |
| Morbidity | Sakha-Yakutia | 256.7 | 252.7 | 214.6 | 205.6 | 207.8 | 195.3 | 194.9 | 187.5 | 192.3 | |
| | Verknevilyuysky | 525.4 | 440.1 | 424.5 | 339.7 | 263.1 | 192.7 | 211.0 | 170.0 | 171.9 | 158.4 |
| Bacillary-positive cases | Sakha-Yakutia | 88.6 | 89.6 | 89.8 | 91.6 | 95.4 | 88.8 | 96.8 | 97.1 | 95.4 | - |
| | Verknevilyuysky | 199.0 | 189.9 | 146.2 | 151.0 | 103.4 | 103.4 | 89.4 | 78.1 | 106.9 | 83.6 |