Chapter 6
Saskatchewan Health Authority—Preventing the Spread of Tuberculosis

1.0 Main Points

Tuberculosis (TB) is an infectious disease. On average 5–10% of those infected will develop active TB over the course of their lives, which can be fatal if left untreated. Health conditions such as chronic kidney disease, a weakened immune system (e.g., HIV), malnourishment, as well as tobacco use increase a person's risk for active TB disease.

Saskatchewan's rate of TB was 10.9 cases per 100,000 population in 2023—more than twice the national average of 5.1 cases, with higher rates of incidence in northern Saskatchewan. The Saskatchewan Health Authority collaborates with key partners (e.g., Northern Inter-Tribal Health Authority) supporting TB-related services in the province to prevent the spread of tuberculosis.

We found the Saskatchewan Health Authority had, for the period ended January 31, 2024, effective processes to prevent the spread of tuberculosis other than the following six areas. The Authority needs to:

- Work with its partners to update the Provincial Tuberculosis Strategy to ensure the Authority and its partners focus on current risks and trends in preventing and controlling TB. In 2023, there were 138 patients in Saskatchewan with active TB and most patients were in northern Saskatchewan communities.

- Track and assess whether individuals are notified timely about TB cases during close contact investigations to help reduce the risk of spreading TB.

- Establish and use criteria to determine the appropriate treatment delivery method (i.e., direct observation, self-administered) for patients with TB. Direct observation (e.g., in-person) of certain patients taking TB medication is resource intensive. Self-administered treatment may reduce costs for the Authority and its partners (e.g., less travel for nurses), meet patient needs, and still provide adequate treatment.

- Determine the most efficient and effective model to use for TB care in the province. While the Authority offers various types of clinics (e.g., telehealth, in-person), patients attended only 55% of the in-person appointments booked in 2022–23. Assessing other types of models (i.e., virtual care) may help the Authority use TB physicians and nurses more effectively.

- Set clear expectations for publicly reporting outbreaks, which may help reduce the spread of TB.

- Track and analyze key TB information (e.g., clinic attendance, TB case contact notifications) to sufficiently analyze trends and assess whether its TB services meet patient needs and reduce the spread of the disease.

2.0 INTRODUCTION

The Provincial Health Authority Act makes the Saskatchewan Health Authority responsible for planning, organizing, delivering, and evaluating healthcare services within the province. These services include health assessment, screening, and disease prevention.[1]

2.1 Tuberculosis

Tuberculosis (TB) is an infectious disease generally affecting the lungs. TB bacteria spreads when a person breathes in air infected by a person with active TB who exhales the bacteria (e.g., coughs, sneezes, speaks). TB can also infect other organs (e.g., eyes, kidneys), but is generally not contagious in these cases.

Infected individuals who show no symptoms (i.e., latent TB infection) cannot transmit the disease. Latent TB is determined by a skin or blood test. However, on average, 5–10% of those infected will develop active TB over the course of their lives. Treatment for latent TB exists but should be selectively targeted to those at highest risk for progression to active TB disease, due to risks of side effects and cost.[2] Health conditions such as chronic kidney disease, a weakened immune system (e.g., due to HIV), malnourishment, and tobacco use increase a person's risk for active TB disease. The Authority and its partners treated 472 latent TB cases in Saskatchewan in 2023.

In 2022, the provincial rate of active TB was more than twice the national average of 5.1 cases per 100,000.[3] Saskatchewan's active TB rate marginally dropped from 11.9 cases per 100,000 in 2022 to 10.9 cases in 2023. Most TB cases in Saskatchewan affect persons who are either Indigenous (particularly in northern communities) or immigrants from high-risk areas across the world. In 2023, there were 138 patients in Saskatchewan with active TB and most patients were in northern Saskatchewan communities.[4] Active TB can be fatal if left untreated.

In 2022–23, the Authority spent $3.9 million to support its TB Prevention and Control Program, which includes $641,000 received from Indigenous Services Canada. Indigenous Services Canada provides proportional funding to assist with TB services costs such as nurses, travel for in-person clinics, and medication delivery to First Nations communities. The Authority budgeted $3.7 million for its TB Program in 2023–24.

2.2 Importance of Timely Tuberculosis Treatment

Tuberculosis is preventable and curable; however, it is the second leading cause of death for infections in the world.[5]

Early detection and treatment play a significant role in controlling the spread of the disease, which is contagious and can spread rapidly through close contacts. Delays in TB diagnosis

[1] *The Provincial Health Authority Administration Regulations*, s. 2(4)(h) and (k).
[2] World Health Organization (2018). *Latent Tuberculosis Infection: Updated and Consolidated Guidelines for Programmatic Management*. p. 9.
[3] www.canada.ca/en/public-health/services/publications/diseases-conditions/tuberculosis-canada-infographic-2022.html (22 March 2024).
[4] Information provided by the Saskatchewan Health Authority.
[5] www.who.int/news-room/fact-sheets/detail/tuberculosis (6 October 2023).

or notifying close contacts increases the risk of TB spreading to and compromising vulnerable populations. In addition, patients who do not complete the required treatment for active TB have a greater risk of relapse or developing drug resistant TB.

Inadequate housing (e.g., overcrowding, inadequate ventilation) and limited access to healthcare results in delayed diagnosis, prolonged infectiousness, and promotes disease transmission to numerous contacts.[6] These conditions are more likely to occur in remote areas of northern Saskatchewan than in other areas of the province.

Without effective processes to prevent and control the spread of TB in Saskatchewan, there is an increased risk of spreading the disease and negatively impacting the quality of life of those people who contract the disease. In addition, delays in treating TB increases the risk of it becoming more difficult to treat and potentially fatal.

3.0 AUDIT CONCLUSION

We concluded, for the period ended January 31, 2024, the Saskatchewan Health Authority had, other than in the following areas, effective processes to prevent the spread of tuberculosis. The Saskatchewan Health Authority needs to:

- **Work with its partners to update the Provincial Tuberculosis Strategy**
- **Assess timeliness of contact (i.e., exposed person) investigations for cases of tuberculosis**
- **Establish and use criteria to determine appropriate treatment delivery method(s) (i.e., direct observation therapy, self-administered therapy) for patients with tuberculosis**
- **Evaluate the care models available (i.e., in-person care, virtual care) to determine an efficient and effective model for tuberculosis patients**
- **Set clear expectations (e.g., when, by who) for making the public aware of tuberculosis outbreaks**
- **Analyze and report key information about tuberculosis to senior management and the public**

Figure 1—Audit Objective, Criteria, and Approach

Audit Objective:

To assess whether the Saskatchewan Health Authority had effective processes, for the period ended January 31, 2024, to prevent the spread of tuberculosis.

Audit Criteria:

Processes to:

1. **Plan to prevent and control the spread of tuberculosis**
   - Plan to meet national standards for tuberculosis treatment
   - Collaborate with provincial and federal agencies (e.g., Ministry of Health; NITHA; Immigration, Refugees and Citizenship Canada) that are key to tuberculosis screening, treatment and data sharing

[6] *Canadian Tuberculosis Standards—8th Edition*, www.doi.org/10.1080/24745332.2022.2033055 (19 April 2024).

- Identify individuals/areas at risk for contracting or spreading tuberculosis (i.e., create a provincial risk profile)
- Establish strategies to address high-risk individuals/areas

2. **Deliver tuberculosis prevention and control program**
   - Maintain adequate resources (e.g., staff training)
   - Make public aware of tuberculosis (e.g., risks, prevention, symptoms, services available)
   - Screen timely for tuberculosis (e.g., in high-risk individuals/areas)
   - Provide timely treatment and follow-up for positive cases
   - Minimize spread with timely outbreak response
3. **Monitor effectiveness of tuberculosis prevention and control program**
   - Analyze data about tuberculosis prevention (e.g., screening, diagnosis, outbreaks)
   - Report tuberculosis prevention and control program analysis and results to senior management and the public

Audit Approach:

To conduct this audit, we followed the standards for assurance engagements published in the *CPA Canada Handbook—Assurance* (CSAE 3001). To evaluate the Saskatchewan Health Authority's processes, we used the above criteria based on our related work, reviews of literature including reports of other auditors, and consultations with management and an independent consultant. Authority management agreed with the above criteria.

We examined the Authority's policies and procedures, minutes, and other key documents relating to preventing the spread of tuberculosis. We also interviewed key Authority staff. We tested a sample of patient files and examined medical documentation (e.g., lab results, diagnosis support, prescriptions, medical administration records). In addition, we used an independent consultant with subject matter expertise in the area to help us identify good practice and assess the Authority's processes.

4.0 Key Findings and Recommendations

4.1 Collaboration with Key Partners Supporting Tuberculosis-Related Services but Roles Should be Revisited and Clarified

The Saskatchewan Health Authority collaborates with key partners supporting TB-related services in the province, but it needs to revisit and clarify the roles and responsibilities of each key partner in preventing and controlling the spread of tuberculosis in the province (i.e., assigning actions outlined in a new TB strategy).

The Tuberculosis Prevention and Control Unit within the Authority centrally administers Saskatchewan's TB Prevention and Control Program. It holds all TB health records for the province and tracks information about active and latent TB cases in its IT system.

The Unit includes a manager, administrative staff, and TB-specialists including seven physicians, 10 nurses, and seven workers. Only TB physicians can diagnose and prescribe medications. TB workers perform duties such as picking up medication sent to the community from the designated pharmacy and observing patients taking the prescribed medication. We found the Authority appropriately offered periodic TB training to the nurses and workers in the Unit.

The Authority divides the province into eight geographic areas for service delivery with a clinical team (e.g., TB physician, nurse) assigned to each area. The Unit has three offices located in Saskatoon, Regina, and Prince Albert. Clinical teams travel to communities in the eight geographic areas to deliver TB services, including First Nations communities. Various partners support the clinical teams (see **Figure 2**). For example, Indigenous Services Canada has nurses who provide direct care to TB patients in 37 First Nations communities in central and southern Saskatchewan and the Northern Inter-Tribal Health

Authority (NITHA) has nurses who provide direct care to TB patients in 33 First Nations communities in northern Saskatchewan.

Figure 2—Key Partners in TB Prevention and Control

Northern Inter-Tribal Health Authority (NITHA)[A]
- Provides direct care to patients, declares and manages outbreaks, and promotes awareness of TB in 33 First Nations communities in northern Saskatchewan

Indigenous Services Canada (ISC)—First Nations and Inuit Health Branch, Saskatchewan Region
- Provides funding to Saskatchewan's TB program to assist with costs such as nurses, travel for in-person clinics, and medication delivery related to TB services in First Nations communities (2023–24 budget: $673,000)
- Provides direct TB care to patients, declares and manages outbreaks, and promotes awareness of TB in 37 First Nations communities in southern and central Saskatchewan

Immigration, Refugees and Citizenship Canada (IRCC)
- Coordinates and prioritizes immigrants and refugees for TB screening
- Communicates, through an online portal, latent TB cases to the Authority for screening or follow up

Ministry of Health
- Provides funding to the Authority for provincial TB Program (2023–24 budget: $3.7 million)
- Liaison for national contacts (e.g., provides annual TB reporting to Public Health Agency of Canada)

Source: Adapted from information provided by the Saskatchewan Health Authority.
[A] NITHA is a First Nations' health organization comprised of Prince Albert Grand Council, Meadow Lake Tribal Council, Peter Ballantyne Cree Nation, and Lac La Ronge Indian Band with each having extensive experience in health service delivery in their respective communities.

The Authority's Unit, together with its partners and healthcare professionals (e.g., public health nurses, medical health officers) provide TB-related services (e.g., screening, treatment, contact investigation, public education, staff training) for the province.

The Unit is a member of the Saskatchewan Tuberculosis Partnership Working Group (formed in 2011). The Partnership's purpose is to ensure a collaborative approach to address the complex issues (e.g., outbreaks) contributing to TB prevalence in Saskatchewan. Other members of the Partnership include representatives from the Ministry of Health, NITHA, the First Nations and Inuit Health Branch of Indigenous Services Canada, and other employees from the Authority (e.g., laboratory services).

We found the Partnership met five times between January 2022 and November 2023. In November 2023, it discussed the need for updated terms of reference for the Partnership, as well as renewing the provincial TB strategy (see **Section 4.2** for further details on needing an updated strategy).

In 2016, the Partnership documented the roles and responsibilities of its members. It set out responsibility, provision of support, and required consultations for various tasks related to Saskatchewan's TB Program including overseeing the strategy, developing and maintaining policies and procedures, delivering services (e.g., outbreak response, contact investigation), and quality improvement. For example, NITHA responds, and is responsible for, an outbreak occurring in a northern First Nations community under its authority. The NITHA Medical Health Officer will lead the local outbreak response.

When updating its terms of reference and renewing the TB strategy, the Authority should update the roles and responsibilities of each key partner to ensure each partner clearly understands and fulfills their role in preventing and controlling the spread of TB in the province (see **Recommendation 1** requiring an updated TB strategy). For example, each partner must understand their roles in addressing, investigating, and reporting on outbreaks to ensure they are appropriately managed and contained.

Working with key partners to deliver TB-related services helps ensure all people with the disease, or at risk of acquiring it, receive the proper support at the right time.

4.2 Tuberculosis Strategy Needs Updating

Saskatchewan does not have a current provincial tuberculosis strategy guiding the Saskatchewan Health Authority's TB Prevention and Control Unit and its partners to reduce TB rates in the province and improve patient outcomes.

In June 2013, the Saskatchewan Tuberculosis Partnership Working Group published *The Saskatchewan Provincial Tuberculosis Strategy 2013–2018* to address the high rates of TB in the province. The strategy focused on five areas as shown in **Figure 3**.

Figure 3—TB Strategy Areas of Focus and Objectives

Focus Area	Objective
Clinical Diagnosis and Treatment	Ensure appropriate use of best practices to support effective management and treatment of TB cases in Saskatchewan
Public Health, Prevention and Community Engagement	Strengthen the public health aspects of tuberculosis
Training and Education	Ensure adequate capacity in healthcare practitioners and TB knowledge in Saskatchewan communities
Epidemiology and Surveillance	Improve surveillance reporting and monitoring of the TB program
Quality Improvement, Program Evaluation and Research	Review existing programs to ensure a proactive, efficient, and effective tuberculosis program

Source: Adapted from *Saskatchewan Provincial Tuberculosis Strategy 2013–2018*.

In 2018, the Authority hired a consultant to evaluate progress on the strategy and received an evaluation report in December 2019. The evaluation report outlined successes, challenges, and included 30 recommendations for improvement. The Partnership created project plans to address key recommendations in each of the focus areas.

We found the Authority implemented some changes (e.g., use of virtual clinics in northern Saskatchewan to improve clinic attendance, improved surveillance reporting); however, it indicated due to the COVID-19 pandemic and other resource challenges (e.g., staffing, outdated technology), it had yet to address many recommendations. For example, the Authority had yet to evaluate its telehealth clinics providing care to individuals with TB.

We found the Authority and its partners have not updated the provincial TB strategy (developed in 2013). Several of our audit recommendations outlining process improvements relate to the strategy areas in **Figure 3**. For example, **Recommendations 2** and **3** relate to better clinical diagnosis and treatment (i.e., tracking and assessing how quickly staff notify individuals about TB cases during contact investigations and utilizing criteria to determine appropriate treatment delivery method(s) for individuals with TB).

The Authority and its partners should consider consulting with high-risk populations and communities (i.e., Indigenous, immigrants) who account for most TB cases in the province to provide a more patient-centred approach and improve the effectiveness of the TB strategy. The Authority should also consider the evaluation report's recommendations when updating its strategy. In addition, the Authority and its partners should review and update the TB strategy periodically.

Since preventing and controlling TB in Saskatchewan involves many partners (see **Section 4.1**), it is important the Authority update the roles and responsibilities, including any reporting requirements, of each key partner involved to ensure consistency in delivering TB services to those affected. Without clearly defined roles and responsibilities, there is an increased risk of confusion between partners that may lead to gaps impacting patient care or increasing community transmission.

Having an updated TB strategy helps ensure the Authority and its partners focus on current risks and trends in preventing and controlling tuberculosis in Saskatchewan.

1. **We recommend the Saskatchewan Health Authority work with its partners to update the Provincial Tuberculosis Strategy, with input from high-risk populations and communities.**

4.3 Public Made Aware of Tuberculosis

The Saskatchewan Health Authority and its partners communicate general information and resources to the public about tuberculosis and disease prevention. However, as noted in **Recommendation 5**, the Authority needs to set clear expectations for notifying the public when an outbreak occurs.

The Authority maintains a public webpage for TB prevention and control, which contains information about its TB Prevention and Control Program (e.g., goals and services) and various links to other resources such as the *Canadian Tuberculosis Standards*, TB Resources for Clients and Families, and TB Resources for Health Providers.[7]

The TB Resources for Clients and Families section of the Authority's webpage contains various documents to increase the public's understanding about the disease, such as:

- Tuberculosis Information—explains active and latent TB, risk factors, and signs and symptoms of active disease
- Tuberculin Skin Test—describes who should be tested, how the skin test works, and what the results mean
- Contact Investigations Frequently Asked Questions—explains who is considered TB case contacts, the contact investigation process, and what a contact can do

[7] www.saskhealthauthority.ca/your-health/conditions-illnesses-services-wellness/all-z/communicable-disease-control/tb-prevention-and-control-saskatchewan%20 (12 April 2024).

The Authority does not actively engage in activities that educate or promote awareness about TB to the public (e.g., social media, radio, tv advertising). The Authority indicated it relies on its partners such as the Northern Inter-Tribal Health Authority (NITHA) and Immigration, Refugees and Citizenship Canada (IRCC) to increase public awareness of TB in high-risk populations, like Indigenous communities in northern Saskatchewan and immigrants from certain regions across the globe (i.e., those from higher risk areas).

We found NITHA's website contains materials about TB in various formats including posters, client handouts, audio files for radio announcements, and videos of survivor stories. Audio files are available in English, Cree, and Dene to support communication with Indigenous communities.

We also found IRCC provides information on its website about medical requirements for foreign persons applying to enter Canada, which includes screening for TB. According to its website, the IRCC provides a handout to applicants who require medical surveillance for the disease to enter Canada. The handout outlines the responsibilities of the applicant, some risk factors, signs and symptoms, and each province's contact number for public health authorities (e.g., Saskatchewan's Tuberculosis Prevention and Control Unit). IRCC makes this handout available in several languages, including English, French, Chinese, Hindi, and Tagalog.

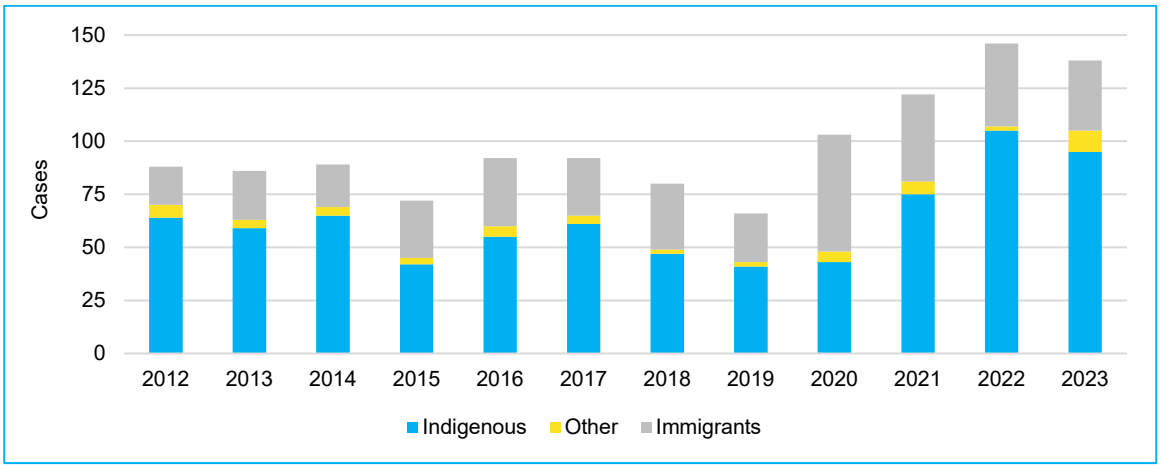
Public awareness is key to preventing the spread of TB, especially in high-risk populations as informed individuals are more likely to seek medical attention promptly. The Authority relies on its partners to carry out certain public awareness initiatives. We suggest the Authority periodically review the content and frequency of its partners' communications materials to determine whether they communicate the appropriate messaging. Also, see **Recommendation 5** about setting clear expectations for communicating outbreaks.

4.4 Populations and Individuals at Risk of Tuberculosis Identified

The Saskatchewan Health Authority identifies key populations and individuals at risk for contracting or spreading tuberculosis.

Each year, the Authority's Tuberculosis Prevention and Control Unit prepares a surveillance report on epidemiological information that helps the Authority identify key populations at risk of contracting or spreading TB. As shown in **Figure 4**, most Saskatchewan TB cases infect persons who are either Indigenous (particularly in northern communities) or immigrants from high-risk areas across the world. In 2023, Saskatchewan had 95 active TB cases in its Indigenous population, making up 69% of all active cases (138 total) in the province. In addition, 33 active TB cases in the province's immigrant population represented 24% of all active TB cases in 2023.

Figure 4—Saskatchewan Active Tuberculosis Cases by Self-Identified Ethnicity



Source: Adapted from Information provided by the Saskatchewan Health Authority.

The Authority works closely with its partners (e.g., NITHA) in high-incidence communities to provide TB-related services (e.g., screening, treatment) that considers local community needs and cultures. For example, NITHA builds relationships with Indigenous people to instill trust and help them feel safe to seek medical care.

The Authority also regularly communicates TB risk factors to its healthcare providers (e.g., family physicians) so they are aware and can identify potential TB in their patients timely. For example, in April 2023, the Authority distributed a fact sheet, *Take Action Against TB: A Guide for Healthcare Providers,* outlining symptoms and risk factors of the disease. Consistent with good practice, the Authority's TB risk factors (i.e., higher risk of TB infection) include:

- HIV infection
- Children under five years of age
- Chronic kidney disease
- Transplant recipients
- Moderate/high dose steroid use
- Heavy alcohol or cigarette use
- Cancer (lung, sarcoma, leukemia, lymphoma, or gastrointestinal)
- Diabetes
- Homelessness
- Congregate settings with vulnerable populations (e.g., shelter, daycare)

Identifying high-risk populations and communicating TB risk factors to healthcare providers like family physicians, helps the Authority to increase disease awareness, and more timely diagnosis and treatment of TB, especially for high-risk individuals as they are more prone to TB and therefore, should be tested.

4.5 Patients Screened and Diagnosed Timely

The Saskatchewan Health Authority screens and diagnoses at-risk patients timely, which helps control the spread of tuberculosis.

When a family physician refers a patient at high risk of developing TB (e.g., exposed to a person with active TB, has HIV) to the Tuberculosis Prevention and Control Unit or a patient

has been identified as a contact, a TB physician or nurse screens the patient with a skin or blood test.[8,9] These screening tests, determined at the discretion of a TB nurse or physician, can only detect the presence of tuberculosis and cannot differentiate between latent or active TB. For example, a TB physician may select blood screening test for immunocompromised patients as it may be more accurate than a skin test.

TB nurses perform the skin tests either in a clinic or at the patient's home. See further details about clinics in **Section 4.9**. The TB nurse would visit the patient's home when a patient cannot travel to a clinic for screening.

For the blood screening tests, the Authority requires a patient to travel to one of seven hospitals in the province as rapid testing of the blood is needed for proper results.[10]

If a patient already shows symptoms (e.g., prolonged cough, chest pain, weakness, fatigue, weight loss) or had a positive TB skin test in the past, they do not need an additional screening test. A previous positive skin test means the patient has latent TB. In both cases (i.e., presenting with symptoms, previous positive TB screening test), the TB physician will send the patient for further diagnostic testing (e.g., chest x-ray, sputum culture) to determine whether they have active TB.[11]

The Authority expects a TB nurse or physician to screen patients within three days of their initial evaluation.

During our testing of 58 patient files, we found:

- 30 patients had a screening test (i.e., blood or skin test) completed
- 20 patients previously tested positive, so, did not require a screening test
- Eight patients already showed symptoms, so, did not require a screening test

For all patients who had a screening test, they either received the test within three days of initial evaluation by a TB nurse or physician, had reasonable explanations for delays, or had the test prior to seeing a TB physician. For example, screening tests may experience delays when staff suspect a patient has extrapulmonary TB (i.e., TB in organs other than the lungs) as it can be harder to diagnose and may not present the same symptoms as pulmonary TB (e.g., sputum, coughing).

If a patient shows a positive screening test or presents to care with symptoms indicative of the disease, the TB physician proceeds with further testing (e.g., chest x-ray, sputum culture) to obtain a diagnosis. The Authority expects a TB physician to diagnose patients within three days of an abnormal chest x-ray or positive sputum results.

[8] A tuberculin skin test (TST) measures a skin reaction to an injection of tuberculin purified protein derivative. An interferon-gamma release assay (IGRA) is a blood test showing if tuberculosis is present.
[9] Good practice discourages screening for TB infection among persons or groups who are healthy, have a low risk of exposure to TB, or have a low risk of progressing to active TB.
[10] A phlebotomist at the Royal University Hospital (Saskatoon), St. Paul's Hospital (Saskatoon), Victoria Hospital (Prince Albert), Regina General Hospital, Pasqua Hospital (Regina), La Loche Hospital, and Meadow Lake Hospital collects blood for testing, however blood is only tested at Royal University Hospital.
[11] A sputum culture is a test that checks for bacteria or another type of organism that may be causing an infection in the lungs or the airways leading to the lungs. Sputum is a thick mucus made in the lungs. my.clevelandclinic.org/health/diagnostics/25174-sputum-culture (7 November 2023).

During our testing of 28 patients diagnosed with active TB, we found:

- 17 patients had a timely diagnosis (i.e., within three days of an abnormal chest x-ray or positive sputum results).
- Six patients had delayed diagnosis due to having extrapulmonary TB and needing tests from other physicians (e.g., eye specialist).
- Five patients had delays in diagnosis (14–68 days). However, delays were beyond the Unit's control (e.g., untimely lab results, patient disengaged [not attending clinic appointments or meeting with TB physicians and nurses]).

Diagnosing patients with tuberculosis timely decreases the risk of spreading the disease to other individuals as it is contagious and can spread rapidly through close contacts.

4.6 Timeliness of Contact Investigations Not Assessed

The Saskatchewan Health Authority does not track or assess the timeliness of notifying individuals during contact investigations.

When a patient is diagnosed with active tuberculosis, nurses (e.g., Authority TB nurses, Northern Inter-Tribal Health Authority nurses) interview the patient to get information on family, routines, and other information (e.g., who the patient lives with) to build a list of contacts.[12] For example, a NITHA nurse interviews patients in a NITHA community and Authority TB nurses provide assistance, if needed.

Based on this information, nurses assess the contact's level of exposure. For example, the Authority considers household contacts (those who regularly sleep in the same household or in a congregate setting such as extended family, boarders, roommates) to be high-priority. Non-household contacts (e.g., those who have regular contact with the patient on weekly basis, but not daily exposure such as caregivers, close friends, classmates, coworkers) are medium-priority contacts.

Once nurses create a list of prioritized contacts, nurses and community workers notify individuals of their TB exposure and make screening appointments. The Authority requires individuals assessed as high priority be contacted and screened within seven days of identification, and medium priority be contacted and screened within eight weeks (i.e., 40 business days). We found this aligns with good practice.

The Authority tracks all contacts identified for each original case (i.e., first case identified in a group of related TB cases), as well as the dates nurses identified and contacted the contacts. However, the Authority does not electronically track the date nurses notified the contacts in its IT system. Nurses document this date in notes within the patient's file. Therefore, the Authority does not readily know whether it notified and screened all contacts timely.

[12] *The Public Health Act, 1994*, s. 33 and *The Disease Control Regulations* s. 7 and 8 require persons with active TB to disclose their contacts to health officers. Health officers must inform each contact of their exposure and duty to get screened.

During our testing of 30 contact investigations, we found:

- 24 contacts notified and screened (when necessary) timely.
- Two contacts notified late (6 and 13 days after expected date) but had reasonable explanations for the delay (e.g., contact hospitalized, changed phone numbers). Due to having a previous positive screen test, these two individuals did not need to be screened again but proceeded to diagnostic testing (e.g., chest x-ray).
- One contact with active TB notified late (5 days after expected date). This person was in hospital for an unrelated medical condition and could not be reached for contact investigation.
- The Authority notified two high-priority contacts 6 and 12 days later than expected and did not have rationale for the delay. One patient took another three days to be screened (therefore total 9 days later than expected). Both patients were diagnosed with latent TB and were not contagious.
- One medium-priority patient (part of workplace exposure) was screened 74 days after the expected timeframe of 8 weeks. Due to the Authority not tracking the date of notification, we could not assess timeliness of notification. The patient was diagnosed with latent TB.

When the Authority does not track the date it contacts individuals due to close contact with a person with active TB, it limits its ability to analyze timeliness of contact investigations. Contact investigations not completed timely increases the risk of the Authority not identifying and treating TB cases timely, which may increase the risk of spreading TB.

2. We recommend the Saskatchewan Health Authority track and assess when individuals are notified about tuberculosis cases during contact investigations.

4.7 Timely Treatment and Monitoring of Tuberculosis Patients

The Saskatchewan Health Authority provides timely treatment and monitoring of patients with active and latent tuberculosis.

Once a TB physician confirms diagnosis, they prescribe treatment medication. The Authority centrally stores medication at the TB pharmacy in Saskatoon and distributes it to a patient's location to start treatment. For example, if a patient lives in an urban centre, staff courier (e.g., Canada Post, Fed Ex) medications to the patient's city of residence and a nurse (TB nurse or community nurse) delivers the medications to the patient. If a patient lives in a remote area, the pharmacy sends medications to the nearest medical clinic and a nurse (TB nurse or community nurse) delivers the medications to the patient. In each case, the nurse will review how the patient should take the medication and observe them doing so.

In 2023, there were 138 patients in Saskatchewan with active TB. There have been five TB deaths in Saskatchewan in the past three years.

Patients require treatment for active TB. Physicians generally treat active TB with a combination of four antibiotics, taken regularly (e.g., daily, three times per week) for at least six months, with the patient remaining contagious up to two weeks into their treatment. If individuals do not take antibiotics as directed, the TB physician may extend treatment past six months to make up missed doses unless a prolonged treatment interruption occurred. Prolonged treatment interruptions may require restarting TB treatment. The Authority expects patients to start treatment three days after diagnosis—this is consistent with good practice.

Nurses monitor active TB patients (e.g., monitor symptoms, adverse reactions) when they administer medication throughout treatment.

During our testing of 28 patients with active TB, we found:

- 20 patients started treatment within three days.
- Eight patients had delayed treatment starts (between 4–15 days after diagnosis). All had reasonable explanations for the delays (e.g., medication shipping time, unable to contact patient). In five of these cases, the patient was not contagious or deemed low risk for spreading the disease.

Of these 28 TB patients, we also found:

- 20 patients completed the prescribed treatment
- Seven patients stopped treatment before completion (e.g., adverse reaction to medication, patient not engaged in care). While the patients did not complete the required treatment, we found they received enough doses to no longer be considered contagious.
- One patient stopped treatment as it was later determined the patient did not have TB.
- All patients received ongoing monitoring by nurses during treatment.

Treatment is optional for latent TB. Patients with latent TB have the option to be monitored rather than to take medications. A TB physician monitors latent patients for symptoms (i.e., latent TB progressing to active) every six months (for up to two years). If a patient decides to take medication, they will take a less intensive medication regimen compared to active TB (e.g., one dose per week for 12 weeks or one dose per day for four months). Good practice recommends patients start treatment within 12 months of latent TB diagnosis or exposure.

During our testing of 30 patients with latent TB, we found:

- Two patients chose monitoring instead of medication.
- 28 patients started treatment within 12 months (ranged from 8–320 days). After starting treatment, we found seven of these patients stopped treatment and moved to monitoring mainly due to reactions to medication. For the patients who had ongoing treatment, they completed treatment as required.

- TB physicians followed up and monitored all patients as expected (e.g., every six months).

Having timely treatment decreases the risk of the spread of TB and the risk of negative treatment outcomes for the patient.

4.8 Analysis of Treatment Delivery Methods Needed

The Saskatchewan Health Authority does not have criteria to determine the treatment delivery method best suited for individual tuberculosis patients.

The *Canadian Tuberculosis Standards* set various medication treatment regimens and delivery methods for both active and latent TB.[13] Physicians may prescribe:

- Daily medication treatment (i.e., five or seven times per week)
- Intermittent medication treatment (e.g., three times per week)
- Medication delivery using directly observed therapy (DOT) requiring healthcare staff (e.g., nurse, TB worker) observing the patient taking their TB medication
- Medication delivery using self-administered therapy (SAT) where patients self-administer medications and nurses do monthly check-ins to monitor medication progress and any adverse effects

Good practice recommends physicians use DOT for patients who have a higher risk of adverse outcomes (e.g., persons with HIV, substance use or mental health disorders, higher risk of non-adherence). It also recommends DOT be required for treatment of active TB with all intermittent (i.e., non-daily) regimens to ensure adherence, as medication is taken less often and missed doses can have greater consequences (e.g., treatment failure, relapse, acquired drug resistance).

The Authority's standard practice for active TB treatment delivery is in-person, community-based DOT during the initial phase of active TB—this requires health workers (e.g., TB nurses, community nurses, NITHA nurses, TB workers) to travel to the patient's location (e.g., community, home) to observe and support the patient taking their medication.[14] During the continuation phase of treatment, treatment delivery can be in-person or virtual DOT. For example, with select patients, to accommodate their lifestyle (e.g., patient works at a remote location), a TB physician may approve real-time videoconferencing to observe patients taking their medication.

The Authority does not have the technology to observe patients taking medication through recorded video.[15]

[13] The Canadian Thoracic Society (CTS) and the Public Health Agency of Canada (PHAC) jointly funds, edits, and produces the Canadian Tuberculosis Standards. The clinical recommendations in the Standards are those of the CTS.
[14] Initial phase of TB treatment typically lasts two months and has patients take a greater number of medications before moving to the continuation phase. The continuation phase has patients taking fewer medications and typically lasts four months.
[15] Video DOT uses video enabled devices (e.g., smartphones) to facilitate remote interactions between patients and healthcare workers to promote medication adherence and clinical monitoring. www.ncbi.nlm.nih.gov/pmc/articles/PMC10042619/#:~:text=Directly%20observed%20therapy%20(DOT)%20for,DOT%20can%20present%20logistical%20challenges (22 April 2024).

During our testing of 28 active TB cases, we found all treatment administered using directly observed therapy (DOT). Of the 28 latent TB cases we tested where the Authority administered treatment, approximately 70% of the cases used DOT.

We also found 12 cases (eight active TB patients/four latent TB patients) of the 56 tested to be over 95% compliant with taking treatment as prescribed using DOT. This may suggest the Authority could have used self-administered therapy instead of directly observed therapy in certain cases.

Directly observed therapy is resource intensive requiring health workers to observe (in person or virtually) patients taking their TB medication three to five times per week for active TB or once per week for latent TB. Patients must connect with health workers to take medication during Authority business hours (i.e., 8 a.m.–5 p.m., Monday to Friday).

Self-administered therapy (SAT) would allow the patient to maintain independence, accommodate lifestyles, and instill trust in the healthcare system through independent treatment.[16] As SAT uses less resources, it may potentially reduce costs for the Authority and its partners (e.g., less travel for nurses) and ensure effective use of nurse time.

Having criteria to assess the delivery method best suited (e.g., in-person, virtual, self-administered) for each patient would help to meet the needs of TB patients. It may also help reduce costs associated with treatment delivery for tuberculosis.

3. **We recommend the Saskatchewan Health Authority utilize criteria to determine an appropriate treatment delivery method(s) for patients with tuberculosis.**

4.9 Evaluation of Tuberculosis Care Model Needed

The Saskatchewan Health Authority uses a clinical care model to provide tuberculosis screening, diagnosis, and treatment. However, a virtual-care model is emerging as good practice and may better meet the needs of the Authority and TB patients.

Residents of northern Saskatchewan are disproportionately affected by the disease. Of the 138 active TB cases in 2023, 61 (44%) lived in Indigenous communities in northern Saskatchewan.

Northern Saskatchewan communities are remote and require more travel for both patients and practitioners to screen, diagnose, and treat TB. The Authority uses a combination of remote (over the internet), telehealth (over the phone), and mobile (in-person) clinics to provide care to individuals in these communities and increase accessibility for patients. Each clinic type connects a patient directly with a TB physician for screening, diagnosis, treatment, or monitoring symptoms.

Our analysis of TB clinics held in northern Saskatchewan found the Authority held 77 clinics in northern communities in the 2022–23 fiscal year. Overall, patients attended only 55% (1,070 out of 1,957) of the appointments booked at these clinics (see **Figure 5**). Poor clinic

[16] *Canadian Tuberculosis Standards—8th Edition*, www.doi.org/10.1080/24745332.2022.2033055 (19 April 2024).

attendance increases the risk the Authority does not screen or diagnose patients timely and TB may spread in the community.

Figure 5—Summary of Tuberculosis Clinic Attendance in Northern Communities (for fiscal year, April 1–March 31)

Clinic Type	2021–22		2022–23		2023–24 (up to November 2023)	
	Clinics Held	Attendance	Clinics Held	Attendance	Clinics Held	Attendance
Remote	32	46%	25	59%	7	49%
Telehealth	15	48%	17	57%	15	58%
Mobile	11	51%	35	51%	23	56%
Total	58	48%	77	55%	45	56%

Source: Adapted from Saskatchewan Health Authority records.

The Authority indicated there are barriers that may prevent patients from attending clinic appointments. These barriers include lack of transportation, clinic timing conflicting with work schedules, and previous trauma or mistrust with the healthcare system.

The Authority manually summarizes clinic data for northern communities. Due to system limitations, the Authority does not analyze attendance for all TB clinics held in the province (e.g., number of clinic appointments attended, by location, by type). Without this information, the Authority cannot fully assess its current clinical care model to determine whether it should make changes to clinic delivery (see **Recommendation 6** about analyzing key information).

We found other jurisdictions, such as Alberta and British Columbia, have moved toward a virtual-care model. Under this model, centrally located TB specialists (e.g., physicians, nurses) are dedicated to virtual care. TB specialists hold weekly rounds to discuss all TB cases and communicate treatment recommendations to community nurses. Community nurses work with patients on treatment and gather any required patient information (e.g., symptoms, medication reactions) or samples (e.g., collect sputum) to send to TB specialists for review. Patients are encouraged to see their physician periodically to monitor progress, but do not need to see a TB physician. TB physicians only meet with patients face-to-face when necessary (e.g., medically complex case).

Missed clinic appointments increase the risk the Authority does not diagnose potential TB patients timely and tuberculosis continues to spread in the community. When patients do not attend clinics, both time (e.g., TB physician, TB nurse) and money (e.g., chartered flights for mobile clinics) spent to hold the clinic are used less effectively.

4. **We recommend the Saskatchewan Health Authority determine the most efficient and effective tuberculosis care model (i.e., virtual, clinical) to use for tuberculosis care in the province.**

4.10 Expectations Needed for Informing the Public of Tuberculosis Outbreaks

The Saskatchewan Health Authority has guidelines to manage tuberculosis outbreaks. However, guidelines do not set clear expectations about informing the public of an outbreak.

As shown in **Figure 6**, the Authority has guidelines for managing a TB outbreak.[17] We found these guidelines align with good practice. However, while the guidelines state informing the affected community as early as possible in an outbreak investigation is crucial, it does not set clear expectations (e.g., when and by who) for public reporting.

Figure 6—Guidelines for Managing Tuberculosis Outbreaks

- Organization and Resources: sets out key staff and roles (e.g., field staff to carry out contact investigation and follow up), as well as other supports needed (e.g., hospital facilities with airborne isolation rooms and diagnostic examinations) for TB outbreak response
- Communication with healthcare providers (e.g., emergency room, primary care in outbreak community)
- Prompt isolation and treatment of active disease cases
- Case-finding, identification of source case, and contact investigation
- Timely community outreach and education
- Evaluation of the process and outcome of the outbreak investigation

Source: Adapted from the Saskatchewan Health Authority's guidelines *Management of a TB Outbreak*.

Management indicated it was at the discretion of the local Medical Health Officer (e.g., NITHA, the Authority) when and whether to inform the public. See **Recommendation 1** about updating the TB strategy and clarifying roles and responsibilities of partners, which should include outbreak management.

Since 2021, Saskatchewan declared four outbreaks—two in 2021, one in 2022, and one in 2023. We found each of the outbreaks occurred in northern Saskatchewan.

The local Medical Health Officer declared the TB outbreaks and worked with the Authority to mobilize resources in the communities to respond and contain the outbreak (e.g., supporting contact investigations, mobile chest X-ray machine sent to community). The Authority indicated these outbreaks involved 113 cases, 2,245 contacts identified and resulted in four deaths. The Authority also indicated prolonged sheltering in place due to the COVID-19 pandemic, sometimes in overcrowded settings, set the stage for poor TB control and affected the delivery of TB services in the province.

During our testing of two outbreaks, we found a Medical Health Officer:

- Declared one outbreak two days after the original case (i.e., the first case identified in a group of related TB cases). They notified the public on the same day through radio ads in the community and surrounding area, social media posts, and news outlets.

- Declared another outbreak 79 days after the original case. They did not notify the public of this outbreak. We found the Medical Health Officer had rationale for not notifying the public.

[17] An outbreak is an increase in the number of active TB cases over what is usually expected for that community or region over a given time. *Saskatchewan Provincial Tuberculosis Strategy 2013–2018*. (June 2013).

In each case, we found the Authority and its partners worked together to contain the outbreak by conducting home visits, as well as providing numerous mobile clinics and chest x-rays.

Setting clear expectations for reporting outbreaks to the public timely could help promote consistency, and increase awareness of outbreaks. This could help reduce the spread of tuberculosis in a community.

5. We recommend the Saskatchewan Health Authority set clear expectations for making the public aware of tuberculosis outbreaks.

4.11 Limited Analysis and Reporting of Key Information

The Saskatchewan Health Authority does not analyze and report sufficient information to determine whether it is effectively controlling the spread of tuberculosis in Saskatchewan. Its current IT system does not track key information to support effective analysis (e.g., contact investigation notification dates, clinic data).

The Authority's TB Prevention and Control Unit tracks information about all active and latent TB cases in the province in its IT system including:

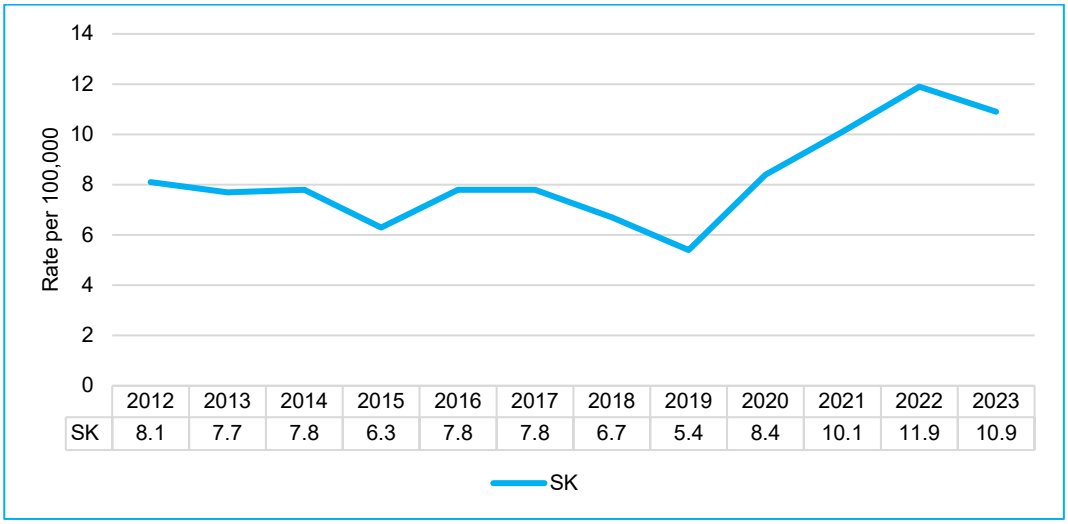
- Demographic information (e.g., birth date, location, ethnicity)
- Diagnosis date and type of TB
- Lab testing and chest x-ray results
- Treatment information (e.g., start and stop date, compliance rate, reason treatment stopped)
- Risk factors (e.g., HIV, alcohol use, exposure to TB)

Using this data, the Authority prepares an annual Surveillance Report, which it shares with medical health officers, infectious disease physicians, the Tuberculosis Partnership Working Group, and communicable-disease leads. The Report includes various graphs and charts to summarize the TB situation in the province (e.g., TB cases by age group, geography, ethnicity). It also includes 10 years of TB trends in the province; however, the Report lacks targets, analysis to explain trends, and action plans to address identified gaps.

The Saskatchewan Provincial Tuberculosis Strategy 2013–2018 set a target for a 25% reduction in the rates of new and relapsing cases of TB in Saskatchewan by 2017–18 and a 50% reduction by 2022–23. We found no evidence the Authority monitors or reports on these targets. Per the surveillance reports, as shown in **Figure 7**, the Authority's rate of active TB cases has increased since 2017–18.

The Authority achieved a 33% reduction in the active TB rate from 8.1 cases per 100,000 people in 2012 to a low of 5.4 cases by the end of 2019. However, the COVID-19 pandemic reversed the trend with an active TB rate of 10.9 cases per 100,000 reported in 2023, a 35% increase since 2012.

Figure 7—Rate of Active Tuberculosis Cases per 100,000 Population from 2012–23 in Saskatchewan



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
SK	8.1	7.7	7.8	6.3	7.8	7.8	6.7	5.4	8.4	10.1	11.9	10.9

Source: Information provided by the Saskatchewan Health Authority.

We found the Authority does not track, analyze, or report key information such as contact investigation notifications (see **Section 4.6**) or clinic attendance data (see **Section 4.9**).

Good practice recommends collection and analysis of additional information to measure the effectiveness of the TB program such as:

- Treatment regimen prescribed and number of doses taken
- Standardized risk factors—the Authority tracks some risk factors, but not consistently for all patients and not in a manner that allows for efficient analysis
- Date of symptom onset
- Days between symptom onset and diagnosis date
- Days between diagnosis date and treatment start date[18]

However, due to IT system limitations, the Authority is not able to efficiently track and analyze this information.

We also found the Authority does not report key information to the public. We found other jurisdictions (e.g., British Columbia) provide annual and quarterly surveillance reports on its website. Reports include information such as TB case reports by month, by sex, by age group, and TB infection treatment starts by month. The Authority includes some of this information in its Surveillance Report but does not share this information publicly to increase awareness about the prevalence of TB in the province.

[18] Canadian Journal of Respiratory, Critical Care, and Sleep Medicine (2022). *Canadian Tuberculosis Standards—8th Edition*. Table 1, Chapter 15: Monitoring tuberculosis program performance. www.tandfonline.com/toc/ucts20/6/sup1 (4 March 2024).

Without tracking and analyzing key information, the Authority is unable to sufficiently analyze trends and assess whether its TB services meet patient needs and reduce the spread of the disease.

In addition, without reporting key information annually to senior management, they will be unaware of trends in TB services. Understanding trends can provide support to senior management in making relevant decisions (e.g., resource allocations) to help prevent the spread of tuberculosis.

6. We recommend the Saskatchewan Health Authority analyze and report on key information related to tuberculosis services.

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