Contact investigation outcomes of Canadian-born adults with tuberculosis in Indigenous and non-Indigenous populations in Alberta

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ABSTRACT

OBJECTIVES: Contact investigations are a critical component of tuberculosis control in high-income countries. However, the relative success of conventional methods by population group and place of residence is unknown. This study compares outcomes of contact investigations of Canadian-born Indigenous tuberculosis cases living on- and off-reserve with other Canadian-born cases.

METHODS: In a retrospective analysis, Canadian-born adult culture-positive pulmonary TB cases (2001–2010) were identified. Characteristics of source cases and their contacts were compared by population group. Outcomes of contact investigations, including completion of recommended investigations and preventive therapy, were compared in multivariable analysis.

RESULTS: Of 171 cases of tuberculosis identified, 49 (29%) were Indigenous on-reserve, 62 (36%) Indigenous off-reserve, and 60 (35%) non-Indigenous or Canadian-born, "other". Indigenous people had more contacts identified per case compared to non-Indigenous patients. Case population group and smear status were the main predictors of the success of contact investigations. Of those recommended preventive therapy, close contacts of Indigenous cases on-reserve had the highest rate of completion, at 54%, vs. 41% and 37% for close contacts of Indigenous living off-reserve and Canadian-born "other" respectively ($p = 0.02$). Contacts of Indigenous cases living off-reserve had the greatest delay in assessment and the lowest rates of completion of assessment and preventive therapy. In multivariable analysis, population group, smear status of source case and proximity of contact were predictors of preventive therapy acceptance and/or completion.

CONCLUSIONS: Significant differences in outcomes of contact investigations were observed between population groups. The higher priority of contacts of smear-positive cases appears to influence efficiency of service delivery, regardless of population group. Jurisdictional differences in program delivery, resource availability and perceived risk of transmission likely influence outcomes of contact investigations.

KEY WORDS: Tuberculosis in Canada; tuberculosis in Indigenous peoples; contact investigations

La traduction du résumé se trouve à la fin de l'article.

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In Canada, the incidence of tuberculosis (TB) is significantly higher among peoples of Indigenous ancestry, including First Nations (FN), Métis and Inuit peoples, relative to Canadian-born people of non-Indigenous ancestry.[1] In fact, in Canada, Indigenous peoples account for more than 50% of the Canadian-born cases of TB despite representing only 5% of the overall Canadian-born population, with the majority of the cases being reported in the Prairie provinces and mid to high North.[2,3]

Between the years 2005 and 2009 in Alberta, the rates of active TB among FN peoples living on-reserve were similar to those among FN peoples living off-reserve, at 14.9 and 15.4 per 100,000 respectively.[4] Almost 20% of FN TB cases in the province are identified through contact investigation, which is a significantly higher percentage compared to in other population groups.[4] Contact investigation is considered a high-priority screening activity for TB programs in high-income countries. Close contact, defined as "regular, extensive contact with the source case" whether household or non-household, carries the greatest risk of infection.[5] The traditional concentric circle approach to contact investigation identifies the closest contacts to a case; if there is evidence of transmission among them, the investigation is expanded to contacts with less intense exposure to the index case.[6] The concentric circle approach is recommended by the US Centers for Disease Control on the basis of its simplicity and intuitive appeal.[7] While newer methods have been proposed to address limitations of contact investigations in populations with different social structures, there has not yet been any empirical study of conventional contact investigations in Indigenous peoples against which those new methods might be validated.

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This study compares outcomes of concentric circle contact investigation in Canadian-born Indigenous peoples living on- and off-reserve versus Canadian-born non-Indigenous persons. While tuberculosis also disproportionately affects foreign-born populations in Canada, tuberculosis in the foreign-born is more frequently due to reactivation of previous latent infection, and there is less clustering of cases.[8,9] As such, this study is focused on the performance of contact investigation in Canadian-born population groups. In most provinces, jurisdiction of communicable disease control differs for Indigenous peoples living on- and off-reserve. In Alberta, the First Nations Inuit Health Branch of Health Canada provides ancillary TB services on-reserve, which include case management, contact investigation and provision of directly observed preventive therapy to newly infected contacts. Efficacy of the traditional approach to contact investigation among these population groups is examined to determine how current program delivery is affected by population factors, such as community structure and size of contact investigations, as well as by jurisdictional differences.

METHODS

All contact investigations for Canadian-born cases of pulmonary tuberculosis in Alberta from 2001 to 2010 were evaluated. Data were abstracted from the tuberculosis registry of Alberta Health Services for all adult (>14 years) Canadian-born, culture-confirmed, pulmonary cases of TB ("eligible cases") and included population group, smear status, sex, age and HIV status. For population group, the Indigenous group is defined as persons who reported identifying with at least one Aboriginal group, that is First Nations (North American Indian), Métis or Inuit.[10] Inuit peoples are defined as Indigenous people originating from the Arctic. Métis are people of mixed First Nation and European ancestry who identify themselves as Métis, as distinct from First Nations people, Inuit or non-Aboriginal people.[10] Residence was determined by the location patients reported as being their usual place of residence at the time of diagnosis. Off-reserve people were defined as people who identified as First Nations but did not reside on-reserve most of the time at the time of diagnosis.

In addition to being a notification database, the TB Registry in Alberta systematically collects information on contacts of cases, with emphasis on contacts of pulmonary cases. National standards and provincial guidelines in circulation inform this process. Contact lists are constructed collaboratively by TB control physicians and nurses. The assessment status of contacts is reviewed by TB clinic staff and field nurses at regular intervals over the 12 months immediately following the date of diagnosis of the source case. Contacts are categorized as close if they are "household or equivalent who share same breathing space on a regular basis" with a source case, and the rest are recorded as other.[11] No specific duration of contact was outlined in the Alberta or Canadian guidelines of this era. Data for contacts of eligible cases extracted from the registry included demographics and number of contacts having completed their recommended follow-up.

Contacts may be assessed with a baseline tuberculin skin test (TST) at the time they are identified as a contact. If it is negative, a follow-up TST is performed a minimum of 56 days[5,11] after the date of diagnosis of the source case to see if the individual acquired infection due to contact with the source case. The date of diagnosis of the source case is defined as the start date of treatment, or the date of death in the event the patient died before treatment could begin. Chest X-rays completed after the last date of contact and up to 36 months after were documented as part of follow-up. Time to TST reading and chest X-ray was calculated by determining number of calendar days from date of diagnosis of the source case to diagnostic event. Other data collected included information about risk factors for a false-positive TST result, latent TB infection or progression to disease among contacts, including a history of latent TB infection or active disease with associated treatment completion, prior documented TST, Bacille-Calmette Guerin (BCG) vaccination, and prior episodes of having been named as a TB-contact in Alberta.

Any categorical differences between eligible cases and their contacts were tested using χ^2 and *t*-tests. Fisher's exact test was used when the expected number of counts was less than 5. Outcomes of contact investigations were compared between population groups based on smear status (positive vs. negative). Outcomes for contacts under the age of 5 were examined separately, as they are considered high-risk, vulnerable contacts and are initially prescribed preventive therapy regardless of baseline TST (a practice referred to as window-period prophylaxis). Because these contacts are considered high priority in a contact investigation, time to assessment of contacts under age 5 was also examined separately. Multivariable analysis was used to determine factors associated with outcomes of contact investigation activities. All factors significant at a 20% level in the univariate analysis were considered for multivariate analysis. A purposeful selection method was used to determine important factors in the multivariate regression. SAS version 9.3 (SAS Institute Inc., Cary, NC, USA) was used for the statistical analysis.

Ethics approval for this study was obtained from the University of Alberta Health Ethics Review Board (Panel B) with operational and administrative approvals from Alberta Health Services. Results of this study were presented to the Co-management Health Protection Subcommittee, whose membership is from the three treaty areas of Alberta. This subcommittee reports to the Co-management Committee, constituted of representative Chiefs in the region. Presentation of these results was intended to inform leadership of First Nations communities of the efficacy of tuberculosis programming conducted on-reserve.

RESULTS

Cases

A total of 171 source cases were identified (see Table 1). Of these, 111 (65%) were Indigenous, 49 (24%) on-reserve and 62 (36%) off-reserve. Of Indigenous patients living on reserve, 48 (98%) were Registered First Nations (registered under the Indian Act as First Nations[10]) and 1 was Métis; of those living off-reserve, 30 were Registered First Nations, 24 were Métis, 3 were Inuit and 5 were non-registered First Nations. Sixty cases were identified as Canadian-born other (CBO). The majority of cases were male, and CBO cases were on average older. Significant differences in proportion of smear-positive cases and co-infection with HIV were not identified between population groups.

Table 1. Canadian-born adult pulmonary TB source case characteristics by population group, 2001–2010

	INON *n* (%)	INOFF *n* (%)	CBO *n* (%)	*p*-value
# assessed	49 (29)	62 (36)	60 (35)	
Average age (years ± SD)	45 (19)	49 (16)	55 (18)	**0.01**
Age group (years)				
15–44	26 (53)	25 (40)	16 (27)	**0.02**
45–64	15 (31)	26 (42)	28 (47)	0.22
65+	8 (16)	11 (18)	16 (27)	0.33
Sex				
Male	32 (65)	33 (53)	47 (78)	**0.01**
Female	17 (35)	29 (47)	13 (22)	
Smear				
Positive	28 (57)	40 (65)	31 (52)	0.35
Negative	21 (43)	22 (35)	29 (48)	
HIV status				
Positive	4 (8)	8 (13)	1 (2)	0.18
Negative	38 (78)	48 (77)	51 (85)	
Unknown	7 (14)	6 (10)	8 (13)	

INON = Indigenous on-reserve; INOFF = Indigenous off-reserve; CBO = Canadian-born other.
Bold in table indicates $p < 0.05$.

Contacts

The contacts are summarized in Table 2 according to the smear-status population group and place of residence of their source cases. Smear-positive cases tended to have more contacts overall, while smear-negative cases had fewer contacts. Indigenous on-reserve cases had the highest number of close contacts identified and Indigenous off-reserve cases had the highest number of contacts described as "other" (not close). More contacts from the Indigenous on-reserve group had previous contact with the TB program, having been previously prescribed medication for either latent TB or active disease.

Contact profile

Among those contacts eligible for baseline TST, completion rates differed among population groups, being highest for CBO, followed by on-reserve Indigenous cases, and lowest for those Indigenous cases who lived off-reserve ($p < 0.01$). When follow-up TST at 8 weeks was indicated, fewer people in the off-reserve Indigenous group completed the second one. Rates of completed assessment including a TST, chest X-ray and follow-up were lowest among non-close contacts of Indigenous cases off-reserve (Table 3). Contacts of off-reserve Indigenous cases experienced the greatest delay in assessment, with time to first chest X-ray and/or TST being significantly higher than among the other population groups (Table 3). For numbers of contacts per case and time to assessment, mean and median values differed significantly. This was due to outliers with unusually large numbers of contacts identified or lengthy follow-up assessment times. Therefore, median values were used for comparison between groups.

More pediatric contacts (0–14 years of age) were identified among on-reserve Indigenous cases as compared to CBO and off-reserve Indigenous cases. Pediatric contacts of off-reserve Indigenous cases experienced the longest delay before first TST. Contacts under age 5 for the CBO group underwent chest X-ray sooner than their counterparts in both on- and off-reserve Indigenous groups (Table 3). More pediatric contacts were infected among the two Indigenous population groups as compared to CBO. Preventive therapy acceptance rates for children were highest among CBO, followed by on-reserve, Indigenous pediatric contacts and lowest for off-reserve, Indigenous pediatric contacts ($p < 0.01$, data not shown). Preventive therapy is initiated in contacts under age 5 and discontinued if the repeat TST at 8 weeks is negative (window-period prophylaxis), and very few contacts in this age category (23/201) showed evidence of infection.

Among all contacts, preventive therapy acceptance rates were significantly higher for close contacts of smear-positive CBO and on-reserve Indigenous cases as compared to off-reserve Indigenous cases (Table 4). Of those prescribed preventive therapy, completion rates were highest for close contacts of on-reserve Indigenous cases ($p = 0.02$). In multivariable analysis, population group was a significant predictor of outcomes of contact investigation, including completion of 8-week TST and of preventive therapy (Table 5). Other significant variables included smear status of the source case. TST completion rates were higher when the source case was female, and preventive therapy acceptance rates were higher for close contacts.

Overall, rates of preventive therapy completion were low in all groups, with only 39.8% of contacts who were offered preventive therapy completing same. No significant differences in TST conversion or development of active TB following contact with tuberculosis were observed between the population groups.

DISCUSSION

While few studies have examined population-group differences in contact investigations, especially for Indigenous peoples in Canada, larger numbers of contacts for Indigenous people with TB have previously been reported.[12,13] Higher numbers of contacts for Indigenous peoples living on-reserve may be due to poor housing quality, housing density and over-crowding.[14,15]

In Canada, health service delivery for peoples living on-reserve generally falls under federal jurisdiction. This study indicates that, in spite of difficulties that can arise in the face of multi-jurisdictional control for TB,[16] contact investigations were relatively successful on-reserve as compared to off-reserve, especially with respect to timely completion of follow-up recommendations and preventive therapy. Successful contact investigations on-reserve may be related to staff who live on-reserve assisting in program delivery and to the strong partnership between the provincial TB program and federal agency with jurisdiction over public health on-reserve. Though number of close contacts identified was often larger for Indigenous peoples living on-reserve for the reasons indicated above, it may be easier for staff on-reserve to identify household(s) of people in close proximity to a case. While travel for investigations or assessment is sometimes necessary, public health units on-reserve provide transportation to X-ray, lab facilities or clinics. These are important considerations given that social factors such as lack of transportation or resources and communal living may play a greater role in contributing to an outbreak than organism virulence or ethnicity.[17,18]

Follow-up completion and preventive therapy acceptance rates were lowest for contacts of Indigenous cases living off-reserve. In spite of both presumed and reported barriers to access of health services on-reserve, time to assessment was better on-reserve than

Table 2. Characteristics of contacts of Canadian-born pulmonary TB cases, 2001–2010, by population group and smear status of source case

		Smear positive				Smear negative			
		INON *n*	INOFF *n*	CBO *n*	*p*-value	INON *n*	INOFF *n*	CBO *n*	*p*-value
Total number of contacts		1766	3952	1600		281	125	234	
Contact type	Close	898	690	474		226	113	163	
	Other	868	3262	1126		55	12	71	
Average number of contacts per case by contact type	Close	32.1	17.3	15.3	**0.01**	10.8	5.1	5.6	**0.04***
	Other	31	82	36	**0.048**	2.6	0.5	2.4	0.09†
Median number of contacts per case by contact type	Close	28	11.5	7	<**0.01**	10	3	3	**0.02**
	Other	23.5	28	10	0.26	1	0	1	**0.03**
Median number with history of TB infection/disease per case by contact type	Close	3	1	0	<**0.01**	1	0	0	**0.017**
	Other	2.5	1	0	**0.002**	0	0	0	**0.03**

INON = Indigenous on-reserve; INOFF = Indigenous off-reserve; CBO = Canadian-born other.
* Differences in means were obtained through *t*-tests.
† Differences in medians were obtained through non-parametric methods.
Bold in table indicates $p < 0.05$.

Table 3. Timeliness of assessment of close contacts (ages ≥5 and <5 years) of Canadian-born smear-positive pulmonary TB cases, 2001–2010

	Age ≥5 years				Age <5 years			
	INON *n*	INOFF *n*	CBO *n*	*p*-value	INON *n*	INOFF *n*	CBO *n*	*p*-value
Number identified	797	646	418		101	44	56	
Number of first TSTs done	365	320	264		79	32	50	
Time to first TST (median)	9	17	8	<**0.01**	7	10	3	<**0.01**
Number of initial CXRs done	361	205	61		87	31	52	
Time to first CXR (median)	12	25.5	14	<**0.01**	8	20	1	<**0.01**

INON = Indigenous on-reserve; INOFF = Indigenous off-reserve; CBO = Canadian-born other; TST = tuberculin skin test; CXR = chest X-ray.
Bold in table indicates $p < 0.05$.

Table 4. Preventive therapy recommendation, acceptance and completion rates for contacts ≥5 years of age* by proximity of contact and population group, 2001–2010

		INON	INOFF	CBO	*p*-value
# recommended latent TB infection treatment	Close	209	120	68	
	Other	125	189	115	
# accepted	Close	152 (72.7%)	71 (59.2%)	46 (67.6%)	**0.04**
	Other	56 (44.8%)	109 (57.7%)	72 (62.6%)	**0.01**
# completed	Close	112	387	25	**0.045**
	Other	37	64	42	**0.60**
% complete/ recommended	Close	53.6	40.8	36.8	**0.02**
	Other	29.6	33.9	36.5	**0.51**

* Excludes contacts <5 years of age because of the practice of offering window-period prophylaxis and discontinuing treatment if repeat testing is negative.
INON = Indigenous on-reserve; INOFF = Indigenous off-reserve; CBO = Canadian-born other.
Bold in table indicates $p < 0.05$.

off. This indicates that barriers to access may in fact be greater for Indigenous peoples living off-reserve, perhaps due to lack of such local public health facilities as exist on-reserve, or because people off-reserve are more likely to fall into a "service gap".[16] In 2012, Health Canada published a Strategy Against Tuberculosis for First Nations On-Reserve.[19] However, Health Canada's tuberculosis prevention and control mandate does not include First Nations people living off-reserve or the Inuit, and tuberculosis control for these populations falls under the purview of provincial and territorial programming. Furthermore, the relatively poor outcomes of contact investigation for off-reserve Indigenous cases may be related to more frequent association with inner-city populations in the major cities of the province, changes of address/mobility, or lack of prioritization of tuberculosis as a health concern.[18,20,21] As potential solutions, social network analysis, geographic information systems and genomics have been recommended for enhancing TB contact investigations in population groups with increased mobility and who are under-housed.[18] However, real-time use of genomics is costly and not widely available, and use of this approach provides retrospective insight into outbreaks rather than preventing transmission from a case.[18,22,23] With challenges faced in conducting contact investigation for population groups who have increased mobility and more casual contacts, a risk-oriented model that prioritizes contacts, or else regular enhanced surveillance for active TB may be alternative strategies to the traditional concentric circle approach.

Limitations

The discrepancy in contact investigation outcomes for Indigenous people living on- and off-reserve may not be generalizable to other provinces and territories. Geographic isolation is associated with higher tuberculosis rates and may play a greater role in limiting access to services in other regions.[2,10] Furthermore, tuberculosis programming and services in reserve communities vary between

Table 5. Multivariable analysis of contact investigation outcomes including 8-week TST completion, preventive therapy acceptance and preventive therapy completion, 2001–2010

Predictor		8-week TST completion estimate/*p*-value	Preventive treatment accepted estimate/*p*-value	Preventive treatment completed estimate/*p*-value
Reserve status	CBO	15.0/**0.0123**	−2.0/0.7933	−13.2/0.0566
		0.0	0	0.0
	INON	17.7/**0.0031**	9.5/0.1979	8.9/0.1826
		2.6/0.6337	11.5/1.1377	20.8/**0.0064**
	INOFF	0	0.0	0.0
		−15/**0.0123**	2.01/0.7933	10.7/0.166
Sex of source case	Female	11.0/**0.0358**	−0.9/0.8914	7.5/0.2101
	Male	0	0	0
Source case smear status	Negative	0.7/0.8841	−16.6/**0.0129**	−24.8/**0.0001**
	Positive	0	0	0
Source case age category (years)	15–44	−4.2/0.479	2.0/0.8153	−3.7/0.6494
	45–64	−11.3/0.0681	−2.9/0.7381	−4.1/0.6126
	65+	0	0	0
Contact type	Close	0.0/0.7997	0.0/**0.0289**	0.0/0.6287
	Other	0	0	0
Sex of contact	Female	0	0	0
	Male	0.0/0.4055	0.0/0.157	0.0/0.0958

INON = Indigenous on-reserve; INOFF = Indigenous off-reserve; CBO = Canadian-born other.
Bold in table indicates $p < 0.05$.

provinces. Finally, there is a great deal of heterogeneity between First Nations communities, and not all communities suffer from disproportionate rates of tuberculosis.[3,4]

BCG status was not consistently entered in the database, and BCG history may impact on interpretation of the TST. Vaccination would occur mainly in patients from the on-reserve Indigenous group, though currently only four reserve communities in Alberta still administer BCG vaccination. In general, close contacts of tuberculosis with a positive skin test would be offered preventive therapy regardless of BCG history, as interferon gamma release assays were not widely available in the province during most of the study period.

This study had several other limitations, including its retrospective design. During the study period, policy regarding contact investigation as well as program management changed, which led to heterogeneity in the observed contact investigations over the course of the study period. Data collection limitations included differences in the quality of entered data depending on the health care worker who managed a case, as well as a lack of consistent collection of health history and ethnicity of contacts. Definitions of "close" vs. "other" contacts were imprecise and may have varied. Finally, contact lists may be abbreviated depending on logistics and workload of the health care workers conducting the contact investigation and by how forthcoming an index case is in identifying their contacts. Furthermore, expanding the initial contact list to more remote contacts because an index case is thought to have been particularly infectious and assessment of risk of transmission in various settings are largely discretionary.

CONCLUSIONS

The devastating history of tuberculosis in Indigenous peoples in Canada impacts the acceptance of TB program recommendations and participation in contact investigation. Stigma and the association of tuberculosis with colonization history, sanatoria and residential schools are important considerations in provision of programming that is minimally intrusive and culturally sensitive.[24–26] Other challenges to program delivery may include language and literacy barriers, and increased population mobility between communities, and sometimes between provinces.[17] In Alberta, some of the observed "success" of contact investigation on-reserve may reflect delivery of services on-reserve, improving access and engaging Indigenous health care workers in program delivery. These factors along with community engagement are important in helping to identify TB as an important health issue and go a long way toward building trust.[17,19] The strength of programming and higher preventive therapy completion rates for close contacts on-reserve may contribute to declining tuberculosis rates on-reserve in Alberta.[27] Disproportionate rates of TB among Indigenous people living on-reserve as compared to CBO persist in Alberta in spite of findings that outcomes of contact investigation in the former group compare favourably with the other population groups. Low transmission rates were observed during the study period, indicating that contact investigation is not the only activity required to reduce rates of TB in this population. Other screening programs, such as screening of patients with high-risk medical conditions, may be important in TB control for Indigenous populations, though further research on this may be required.

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RÉSUMÉ

OBJECTIFS : Le traçage des contacts est un élément essentiel de la lutte contre la tuberculose dans les pays à revenu élevé. On ignore cependant quel est le succès relatif des méthodes classiques selon le segment démographique et le lieu de résidence. Notre étude compare les effets du traçage des contacts de cas de tuberculose autochtones nés au Canada (vivant dans des réserves et hors des réserves) avec d'autres cas nés au Canada.

MÉTHODE : Une analyse rétrospective a permis d'identifier les cas de tuberculose pulmonaire positifs par culture chez les adultes nés au Canada (2001–2010). Nous avons comparé les caractéristiques des cas sources et de leurs contacts selon le segment démographique. Les résultats du traçage des contacts, dont l'exécution des traçages recommandés et l'achèvement du traitement préventif, ont été comparés par analyse multivariée.

RÉSULTATS : Sur les 171 cas de tuberculose identifiés, 49 (29 %) étaient des Autochtones dans les réserves, 62 (36 %) étaient des Autochtones hors des réserves, et 60 (35 %) étaient des personnes non autochtones ou « autres » nées au Canada. Il y avait davantage de contacts identifiés par cas pour les patients autochtones que pour les patients non autochtones. Le segment démographique et la positivité ou non des frottis d'expectoration des cas étaient les principaux prédicteurs de succès du traçage des contacts. Parmi les contacts pour lesquels un traitement préventif était recommandé, les contacts étroits des cas autochtones dans les réserves présentaient le taux d'achèvement le plus élevé, soit 54 %, contre 41 % et 37 % pour les contacts étroits des Autochtones vivant hors des réserves et des « autres » personnes nées au Canada, respectivement ($p = 0{,}02$). Les contacts des cas autochtones vivant hors des réserves présentaient le plus long délai d'évaluation et les plus faibles taux d'exécution de l'évaluation et d'achèvement du traitement préventif. Selon l'analyse multivariée, le segment démographique, la positivité ou non des frottis d'expectoration des cas sources et la proximité du contact étaient des prédicteurs de l'acceptation et/ou de l'achèvement du traitement préventif.

CONCLUSIONS : Des écarts significatifs dans les résultats du traçage des contacts ont été observés entre les segments démographiques. La priorité plus élevée accordée aux contacts des cas dont les frottis sont positifs semble influencer l'efficience de la prestation des services, peu importe le segment démographique. Les écarts dans la prestation des programmes et la disponibilité des ressources selon la province ou le territoire et les écarts dans le risque de transmission perçu influencent probablement les résultats du traçage des contacts.

MOTS CLÉS : tuberculose au Canada; tuberculose chez les peuples autochtones; traçage des contacts