Tuberculosis Elimination in Canada: Can we get there?

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I, Richard Long declare that in the past 3 years:

I have received manufacturer funding from the following companies*: No

I have done consulting work for the following companies*: No

I have done speaking engagements for the following companies*: None

I or my family hold individual shares in the following*: None

*pharmaceutical or medical/dental equipment
Definitions:

- **Pre-Elimination**: <10 notified TB cases (all forms) per million population and year.
  
  To be achieved in Canada by 2035.

- **Elimination**: <1 notified TB case (all forms) per million population and year.
  
  To be achieved in Canada by 2050.
FIGURE 1: Tuberculosis incidence and mortality rates and year of first-line antimicrobial tuberculosis drug introduction – Canada: 1924–2012

Tuberculosis in Canada, 2012 (PHAC)
Arden House Conference on Tuberculosis, Harriman, New York, 1959

- “Tuberculosis control... has progressed to the point where virtual elimination of the disease as a public health problem appears to be within reach…”

- “The remarkable progress made against tuberculosis since the advent of chemotherapy has mitigated the fear that used to be felt about the disease. Unfortunately, it has also been accompanied by some complacency and loss of interest in finishing a task that once was considered extremely urgent”.

Actual incidence of tuberculosis in Canada 1989–2013, and projected rates based on pre-elimination targets set in 19972 and 2006.3 [Source for actual rates: Canadian Tuberculosis Reporting System, Public Health Agency of Canada].

Richard Long, and Edward Ellis CMAJ 2015;187:1191-1192
Tuberculosis Rates in Canada and the United States, 2003 - 2013
“To get there” we must focus on three areas:

1. TB in the Foreign Born

2. TB in Indigenous Peoples (First Nations, Métis and Inuit)

3. Federal – Provincial/Territorial Collaboration
“To get there” we must focus on three areas:

1. TB in the Foreign Born
Immigration Trends in Canada:

Proportion of new immigrants to Canada from Europe and Asia/Africa according to time period. Source: Citizenship and Immigration Canada. Canadian Statistics: Immigration population.

CRJ 2015; 22:317-321
Number of New Immigrants from High TB Incidence Countries, Per 100,000 Population

- Canada
- USA
Proportion of New Immigrants to Canada & the USA from High Incidence Countries of Origin

- Canada
- USA
*In Canada, the foreign-born have represented 50% or more of the TB case load since 1991.*

Stop TB USA Tuberculosis Elimination Plan Committee. *A Call For Action On The Tuberculosis Elimination Plan For The United States*, Atlanta, GA: Stop TB USA; 2010.
• The WHO suggests that when foreign-born cases constitute 70% or more of national TB cases, one cannot anticipate more than a 2% decrease in national TB rates through the use of regular TB control programs.

• Under such circumstances, further reductions in national TB incidence and TB elimination require a re-thinking of prevailing TB prevention and control strategies.

HIV-TB - ALBERTA (2003-2012)
Prevalence in the age group 15-64 yr by population group

CBO – Canadian born “other”, FBO – Foreign-born “other”,
CBA – Canadian-born Aboriginal, FBSSA – Foreign-born Sub-Saharan-Africa

1. TB in the foreign-born - considerations

- Re-institute the long form of the census
- Work with Immigration, Refugees and Citizenship Canada and Public Health Agency of Canada towards revision of the surveillance referral process
- Support initiatives aimed at expanded surveillance and targeted treatment of LTBI
- Support of MDR-TB management capacity in major immigrant-receiving provinces
“To get there” we must focus on three areas:

2. TB in Indigenous Peoples (First Nations, Métis and Inuit)
Incidence of active tuberculosis (per 100,000 population) between 1975 and 1990 in Canadian registered Indians and in Indians in the United States

Tuberculosis Rates in Northern Canadian and Alaskan Indigenous Peoples, 2003 - 2012

Year

Tuberculosis Rate (per 100,000)

Canadian North

Alaska
• From the Arden House perspective, the equivocal historical impact of chemotherapy on TB incidence is consistent with two interpretations. One is the belief that endogenous reactivation of old TB infections contributes the majority of morbidity during the decline of an epidemic. If so, curative therapy for TB disease would lessen incident cases only decades later when the reservoir of infection would be nearing depletion without replenishment.

• Conversely, if recent transmission of MTB infection were contributing to TB incidence more than believed, failure to implement treatment programs for rendering incident cases non-contagious would have diluted chemotherapy’s influence on near-term incidence because transmission would continue.
Figure 2: Frequency distribution of Registered Indian pulmonary tuberculosis cases according province, reserve community and sputum smear status in 2007 to 2008. Numbers written over the provincial abbreviations refer to the total number of reserve communities in each jurisdiction. AB Alberta; SK Saskatchewan; MB Manitoba; No Number
Delay in Diagnosis of Source Case(s)

Increased incidence of TB in on-reserve Status Indians
- Increased risk of infection
- Increased risk of disease if infected: diabetes, ESRD, malnutrition, etc.

Provider delays
- Lack of physician/nursing awareness
- Cultural incompetence
- Language discordance

Patient delays
- Mistrust
- Preference for traditional medicine
- Stigma
- Limited education
- Alcohol and drug abuse
- Mental health issues
- Competing priorities

Administrative delays
- Access to care
- Processing of specimens
- Transportation
- Respiratory isolation capacity

Untimely and incomplete evaluation of contacts

Lack of program adherence

Malnutrition, co-morbidities & substance abuse

Unemployment

Inadequate housing

Large Numbers of Susceptible Contacts

Communal living

Northern latitudes
- Indoor living
- Limited sunlight
- Poor ventilation in winter month

Housing density

Environment Favourable to Transmission

OUTBREAK
• “Outbreaks disrupt routine TB control activities and could hinder elimination efforts at the local level if further generations of transmission occur, notably if the prevalence of LTBI has been increased as a result.”

• “Outbreaks also unveil pre-existing weaknesses in TB control activities such as absent or insufficient infection control, diagnostic delays or incomplete evaluation and treatment of contacts”.

TB Prevention and Care Program of Alberta
Do “Virtual” And “Outpatient” Public Health Tuberculosis Clinics Perform Equally Well? A program-wide evaluation in Alberta, Canada

- Over the five-year period, 2008-2012, we compared the performance of the two types of clinics.

- Among 28 performance indicators, “Virtual” clinic performance was equal to, superior and inferior to outpatient clinic performance in 22, 3, and 3 indices, respectively.
AGE AND SEX ADJUSTED INCIDENCE OF TUBERCULOSIS IN ALBERTA, 1989-2013
BUT...

• In their book, “The White Plague”, Rene and Jean Dubos warned of the dangers of treating the symptoms of pathology – that is disease – and ignoring the “social factors that produce susceptibility”.

• In the Many Farms community-health experiments on the Navajo Reservation in the 1950s they were disillusioned when they could not put an end to TB or other diseases that were sustained by social circumstance.

• Arden House members were troubled by visions of TB evading [elimination] by aligning itself into social disparities thereby taking advantage of elusive barriers that would interfere with treatment campaigns.
Figure 1. The Health Impact Pyramid.

Public health focuses on denominators — what proportion of all people who can benefit from an intervention actually benefit. Improvements at the base of the pyramid generally improve health for more people, at lower unit cost, than those at the top. Adapted with permission from Frieden.†
2. TB in indigenous peoples - considerations

- Outbreak and high incidence communities
- Communities becoming an equal partner in TB control
- Implementing the *TB Patients’ Charter of Tuberculosis Care*
- Early diagnosis; effective case and contact management
- Expanded programs of prevention – an elimination strategy
- Implementation of the “Virtual” clinic model to the middle and far North
- Engage with other Federal departments and agencies to address socio-economic factors that contribute to TB
“To get there” we must focus on three areas:

3. Federal – Provincial/Territorial Collaboration
Public Health

• **1959** “Curative treatment of tuberculosis is a public health obligation”.

  Arden House Conference on Tuberculosis

• **1990** Among basic strategies that are consistently effective for TB elimination: “Direct government responsibility for diagnosis, treatment and prevention of tuberculosis (the government is responsible by law for assuring that tuberculosis is identified early and that cure of the patients is achieved)”.

  First IUATLD (European Region)/WHO TB Elimination Workshop at Wolfheze, Netherlands
“(Re-)establishment and/or maintenance of a national tuberculosis network in terms of funding/human resources and facilities is vital”

European Framework for Tuberculosis control and elimination in countries with a low incidence. Eur Respir J 2002; 19:765-75
“One of the basic elements of the World Health Organization global STOP TB initiative is to monitor and evaluate performance and impact, which is a responsibility of public health agencies working on TB control”

3. Federal/Provincial Collaboration – Considerations

- Develop a Canadian TB elimination strategy
- Develop consensus around an accountability document – performance indicators
- Establish an advisory committee for the elimination of tuberculosis with representation from all Provinces and Territories, PHAC, CIC, FNIHB and CSC
- Encourage the National Microbiology Library to work with the Provinces/Territories around centralization of laboratory services
- Promote overseas experiences in young recruits to TB services (inspiration, training, mutual assistance)
- Engage with other federal departments and agencies to address socio-economic factors that contribute to TB