Tuberculosis Treatment, Prevention, and Management in Manitoba: A Population-Based Investigation

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(on behalf of the Deliverable Team)
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Deliverable Rationale

• Manitoba has the highest rate of tuberculosis (TB) in Canada amongst the provinces; it disproportionately impacts certain populations and has a large impact on health care resource use.

• A patient-focused, high-quality system of care cannot be achieved without prior information about system performance.

• No comprehensive provincial TB report currently exists that integrates information from across the various components of the healthcare system.

• This deliverable is intended to provide baseline information that will inform the work of practitioners, program/policy planners and advocacy groups.
Deliverable Objectives

1. Validate select elements of administrative health data and the Manitoba TB Registry relevant to TB prevention, treatment, and/or management.

2. Characterize contacts of persons with active TB disease and the validity of information about contacts in the Manitoba TB Registry.

3. Describe healthcare use by socio-demographic, comorbidity, and disease characteristics for persons with active TB disease and who are under treatment for latent TB infection (LTBI).
Study Data Sources

Manitoba Population-Based Registry

- Manitoba TB Registry
- Income Assistance
- Social Housing
- Education
- Healthy Child MB
- Immunization
- Medical Services
- Lab
- Personal Care Home
- ER
- Homecare
- Health Links
- Clinical
- Vital Statistics
- Provider
- Hospital
- Pharmaceuticals
- Family Services
- Census

• DPIN
• In-hosp. pharma (Cerner)
• DSM
• Cadham
• MDS
• ADT & E-triage
• EDIS
• In-hosp. pharma (Cerner)
Manitoba TB Registry

- Active TB disease is a notifiable disease under the provincial Public Health Act (LTBI is not reportable)
- Laboratory and clinical case reports are submitted to Manitoba Health, Seniors, and Active Living (MHSAL) and then referred to the RHAs for follow up
- The TB Registry maintained by MHSAL captures a variety of information about each case:
  - Demographic and geographic characteristics, contact assessment, bacteriology and x-ray results, course and outcome of treatment, identified drug sensitivities
Study Cohorts

• **Active TB Disease: Defined from Manitoba TB Registry**
  
  – Laboratory-confirmed cases: (a) Clinical specimens smear positive for acid-fast bacilli (AFB); (b) Clinical specimens culture positive for Mycobacterium tuberculosis complex (MTBC); (c) Pathology sample findings suggestive of TB disease
  
  – Clinical cases: Evidence of active TB disease but no culture proof of MTBC; Examples of clinical evidence: x-ray, non-respiratory disease indications, pathological or post-mortem evidence, favourable response to therapeutic trials of prescription drugs

• **Treated LTBI: builds on methodology adopted by Smith et al. (2011); Defined from Manitoba’s prescription drug records**
  
  – Cases with latent TB infection included individuals receiving the following prescription dispensations: isoniazid (INH), rifampin (RMP), sequential use of INH and RMP
  
  – Exclusions are based on selected diagnoses and combinations of prescription medications
Study Cohorts

• **Disease- and Treatment-Free Matched Cohort for Active TB Disease Cases**
  
  - Matched on: Birth year (± 1 year), Sex, Group (First Nations/non-First Nations), RHA based on postal code at case date
  - Controls must have coverage 365 prior to case date and up to 720 days following case date
  - Cannot be active TB cases, contacts of cases, or treated for LTBI
  - Selected without replacement
  - Up to 5 matches for each case

• **Disease- and Treatment-Free Matched Cohort for Treated LTBI**
  
  - Same criteria as above
Overview of Methods

- **Objective #1:** Focuses on active TB cases ascertained from the Manitoba TB Registry
  - Data elements to validate included:
    - In administrative data: TB diagnosis
    - In TB registry:
      - Date of death
      - Demographic characteristics
      - Origin group
      - Diagnoses
      - Treatments
      - Laboratory tests
      - Healthcare services: hospitalization, X-ray
Overview of Methods

- **Objective #2:** Focuses on the contacts of active TB cases ascertained from the Manitoba TB Registry
- **Measures included:**
  - Contacts per case, described by socio-demographic characteristics
  - Contacts assessed
  - Contacts treated for LTBI
  - Contacts who become active TB cases
- **Validity assessment:**
  - Socio-demographic characteristics of contacts
Overview of Methods

- Objective #3: Focuses on active TB cases ascertained from the Manitoba TB Registry and treated LTBI cases ascertained from administrative health data
  - Healthcare use measures: emergency, acute, primary, and supportive care sectors
    - Before and after diagnosis date (active TB) or initiation of treatment date (treated LTBI cohort)
  - Trends in healthcare use up to one year before and 2 years after TB diagnosis/LTBI start of treatment,
  - Tests for differences in healthcare use by socio-demographic, comorbidity, and disease characteristics
  - Tests for differences with matched TB disease- and LTBI treatment-free cohorts
Figure 1. Study Flow Chart for Active TB Cohort

**Step 1: Initial Cohort**
Identify all individuals with an index date (i.e., diagnosis date or date of entry in the Manitoba TB Registry) between April 1, 1999 and March 31, 2014.

N = 2,043

**Step 2: Cohort Exclusions**

#1: Individuals with invalid or missing PHINs
N = 134

#2: < 365 days of coverage before the study index date or < 30 days of coverage after the study index date
N = 223

**Step 3: Final Cohort**

N = 1686
**Step 1: Initial Cohort**
Identify all individuals with a prescription of INH or RMP between April 1, 1999 and March 31, 2014

\[ N = 10774 \]

The date of the prescription is the index date.

**Step 2: Cohort Exclusions**

1. A diagnosis for leprosy ≤ 30 days before the index date
   \[ N = <6 \]

2. For individuals with a prescription for INH only: exclude all individuals with a prescription for RMP, rifabutin, ethambutol, pyrazinamide, amikacin, capreomycin, cycloserine, linezolid, moxifloxacin, para-aminosalicylic acid, or streptomycin that is ± 14 days of the index date
   \[ N = 561 \]

3. For individuals with a prescription for RMP: exclude all individuals with a prescription for INH, clofazimine, ethambutol, pyrazinamide, amikacin, azithromycin, capreomycin, cefazolin, cefotaxime, cefoxitin, ceftiraxone, cefuroxime, ciprofloxacin, clarithromycin, clindamycin, cloxacillin, cycloserine, dapsone, daptomycin, doxycycline, erythromycin, flucloxacillin, fusidic acid, gentamicin, imipenem, levofloxacin, linezolid, meropenem, minocycline, moxifloxacin, mupirocin, para-aminosalicylic acid, streptomycin, sulfamethoxazole/trimethoprim, or vancomycin ± 14 days after (and including) the index date
   \[ N = 3173 \]

4. Individuals with a prescription for INH or RMP up to 180 days prior to the index date
   \[ N = 60 \]

5. < 365 days of coverage prior to the index date and < 30 days of coverage after the index date
   \[ N = 583 \]

**Step 3: Final Cohort**

\[ N = 6392 \]
Conclusions (1)

• Manitoba TB Registry data are of good quality

• There are approximately 125 active TB disease cases and 420 treated LTBI cases each year. There is a disproportionate burden on:
  – Northern Manitoba (esp <18 years)
  – Lowest income groups
  – First Nations on- and off-reserve
  – Foreign-born
  – Persons with certain comorbid conditions (HIV, renal disease, advanced diabetes)
Conclusions (2)

• Some TB Registry case and contact data are incomplete
  • Onset of cough missing from >50% of respiratory TB cases and therefore cannot be used to develop measures about care delivery
  • Contact investigation completion is not well defined and therefore not interpretatable

• Number of TB contacts per case is highest in northern First Nations communities
  • Completeness of TB contact investigations also highest in northern communities
Conclusions (3)

• Active TB cases are high users of the healthcare system:
  – Hospitalization (including multiple days in hospital)
  – ER visits
  – Medical specialists
  – Family physicians
  – non-TB-related prescription medications

• Health care use of persons treated for LTBI is important
  – Modest treatment completion rates leave room for improvement
Thank You / Questions

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