

RISK FACTORS OF RECURRENT TUBERCULOSIS IN BRITISH COLUMBIA (BC), CANADA FROM 1990 TO 2006

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TB – A Worldwide Threat

- One third of world population infected with TB bacillus
- Declared TB as a global emergency in 1993
- Over 8 million active cases and 2-3 million death annually
- Highest number of deaths caused by a single pathogenic agent



TB in Canada

- A country with low incidence: approximately 1600 cases each year and overall incidence was 5 per 100,000 in 2006
- Targeting the elimination of TB
- BC has the highest incidence of TB among three populous provinces of Canada (Ontario, Quebec & BC)
- Incidence of TB was 7.4 per 100, 000 in 2006 in BC
- Centralized TB control system



TB Recurrence

- **Objective:**

- To estimate prevalence and incidence of recurrence in BC
- To identify socio-demographic and clinical risk factors for recurrent TB in this province

- **Rationale:**

- Selected population
- Limited evidence from Canadian setting
- Inadequate control for Confounders

- **Implications:**

- Quality of local TB control program
- Improvement of TB control initiatives



Methods

- Retrospective, Population-based
- Study Population: TB cases registered with the Division of TB Control (DTB)
- Study duration: 1990-2006
- Recurrent case:
 - A TB patient with history of previous active TB that became inactive
- Source of information:
 - Database maintained by TB Control Division at British Columbia Center for Diseases Control



Methods cont.

- Exclusion criteria:
 - No info about staging (new or recurrent episode)
 - Patients diagnosed as new cases in 2005 and 2006
 - Recurrent cases who had 1st episode before 1990
- Follow up time:
 - Time0: date of diagnosis of primary episode
 - Time1: diagnosis date of recurrent episode or left province or death date
- Statistical Analysis: Univariate and multivariable Cox regression

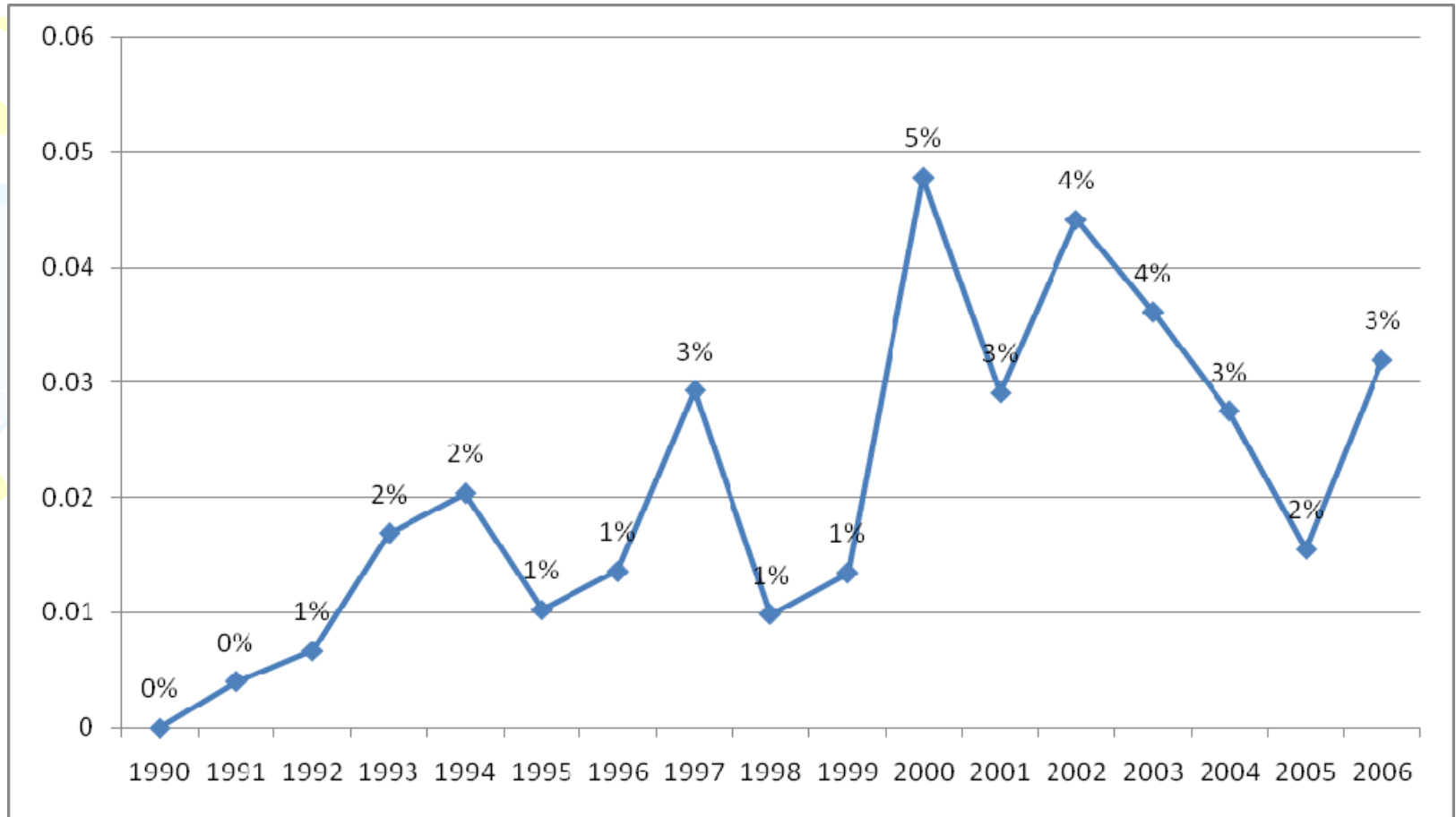
Results

- During the study period, 5408 TB patients were registered with provincial TB control program
- Total recurrent cases: 490 (9.1%, 95% CI: 8.3%, 9.9%)
- Out of 490 recurrent cases, 108 cases were incident recurrent cases
- 4464 patients were eligible for incidence analysis

Characteristics of study cohort (n=4464)

- Mean age: 47.4 years (SD:21.8)
- Male: 54%
- Foreign-born: 66%, Aboriginal people: 13%
- Chinese: 23%
- Median follow up time: 6.1 years
- Incidence: 4 per 1000 pys
- No significant variation in incidence by calendar years (from 1990 to 2006)

Figure 1: Trend of recurrent TB in BC (1990-2006)



Occurrence of recurrence since treatment completion

	<i>Within 6 months</i>	<i>Between 6 -12 months</i>	<i>Between 12-24 months</i>	<i>Between 24-36 months</i>	<i>Between 36 -48 months</i>	<i>Between 48 -60 months</i>	<i>After 60 months</i>
Number of cases	14	18	21	17	9	4	25
Percentage of total incident cases	13%	17%	19%	16%	8%	4%	23%
Cumulative Percentage of total incident cases	13%	30%	49%	65%	73%	77%	100%

Socio-demographic risk factors

	# Incident cases/Total PYs	Incidence per 100,000 PYs	Unadjusted HR (95% CI)
Overall	108/29178	370	
Canadian-born non-Aboriginal	9/5197	173	Reference
Canadian-born Aboriginal	12/4095	293	1.75 (0.74, 4.14)
Foreign-born	87/19363	449	2.52 (1.27, 5.00)
Pan- American Health Region	22/9797	225	Reference
African Region	5/533	939	4.0 (1.51, 10.56)
Eastern Mediterranean and European Region	2/2276	88	0.60 (0.08, 4.45) 0.29 (0.40, 2.12)
Southeast Asia Region	20/4013	498	2.07 (1.13, 3.79)
Western Pacific Region	59/11898	496	2.13 (1.30, 3.47)

Treatment-related risk factors

	# Incident cases/Total PYs	Incidence per 100, 000 PYs	Unadjusted HR (95% CI)
Overall	108/29178	370	
Complete treatment	73/27174	269	Reference
Incomplete treatment	24/1621	1480	5.62 (3.54, 8.92)
Compliant	65/27487	236	Reference
Non-compliant	18/1139	1581	6.53 (3.88, 11.01)
Supervised	18/5893	305	Reference
Self-administered	56/22265	252	0.78 (0.46, 1.33)

Behavioral and medical risk factors

	# Incident cases/Total PYs	Incidence per 100, 000 PYs	Unadjusted HR (95% CI)
Overall	108/29178	370	
Diabetes mellitus	5/1714	292	0.31 (0.12, 0.75)
Alcoholism	7/1390	504	0.59 (0.27, 1.26)
HIV/AIDS	14/838	1670	1.86 (1.06, 3.26)
Drug abuse	12/731	1641	1.80 (0.99, 3.28)
Any Malignancy	2/378	529	0.56 (0.14, 2.26)

Multivariable Cox Regression for risk factors of recurrence

Variable	Controlled for age, gender and birthplace	Controlled for age, gender and birth-country regions	Controlled for age, gender, birth-country regions, treatment completion and compliance
	AHR (95% CI)	AHR (95% CI)	AHR (95% CI)
Canadian-born Aboriginal	1.71 (0.72, 4.06)		
Foreign- born	2.59 (1.29, 5.17)	-	
African Region		3.98 (1.51, 10.53)	
Mediterranean/European Region	-	0.41 (0.10, 1.73)	
Southeast Asia Region		2.17 (1.16, 4.03)	
Western Pacific Region		2.19 (1.33, 3.61)	
Incomplete treatment	6.79 (4.23, 10.89)	7.21 (4.49, 11.62)	4.59 (2.27, 9.26)
Non-adherence to treatment	6.76 (4.00, 11.43)	7.00 (4.12, 11.92)	2.65 (1.25, 5.59)
Self administered therapy	0.72 (0.41, 1.25)	0.68 (0.39, 1.18)	0.78 (0.40, 1.51)
Diabetes mellitus	0.30 (0.12, 0.76)	0.29 (0.12, 0.72)	0.26 (0.08, 0.85)
Alcoholism	1.55 (0.66, 3.67)	1.27 (0.55, 2.94)	0.64 (0.25, 1.60)
Drug abuse	2.74 (1.34, 5.62)	3.66 (1.75, 7.66)	3.06 (1.38, 6.81)
Either HIV or AIDS	2.69 (1.44, 5.02)	3.10 (1.58, 6.08)	2.98 (1.53, 5.81)
Any Malignancy	0.69 (0.17, 2.84)	0.73 (0.18, 3.01)	1.22 (0.29, 5.16)



Conclusions

- Incidence of recurrence is considerably low
- Foreign-birth, incomplete treatment, non-adherence to treatment, drug abuse and HIV / AIDS were important risk factors of recurrence
- Drug abuse and non-compliance to treatment are subject to modifications



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