



# Variations of care quality for infectious pulmonary tuberculosis in Taiwan

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# Introduction

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- TB incidence rate was around 70/10<sup>5</sup> in Taiwan
- Successful treatment rate for newly diagnosed TB was 73% in Taiwan
- Tuberculosis remains the leading infectious cause of death in Taiwan.
- Early detection and rapid successful treatment of infectious pulmonary tuberculosis (PTB) are required to prevent the spread of tuberculosis.

# Aim

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- We attempted to compare care quality among different healthcare institutions in Southern Taiwan.

# Care Quality of PTB

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- Level of conformance with diagnostic guidelines
- Efficiency of diagnostic and treatment process
- Treatment outcome

# Healthcare Institutions (I)

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- Chest Specialty Hospital: the only remaining tuberculosis sanatorium in Taiwan, which is geared towards specialized thoracic disease care, mainly for tuberculosis
- Medical centers: housing over 500 acute staffed beds, are designated to assume the responsibilities of providing healthcare services, training medical professionals, and conducting research.

# Healthcare Institutions (II)

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- Regional hospitals have no less than 250 acute beds and are staffed with physicians of various specialties with the purpose of providing healthcare services to patients and training for specialists.
  - District hospitals are designated to provide primary healthcare services, which are similar to those offered by primary practitioners in clinics providing outpatient services.
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# Results (I)

- From January 1 to June 30 2003, 491 patients with sputum-positive TB, were reported in the study area.
- Among these patients, the medical records of 482 (98%) patients were reviewed. After reviewing medical records, 61 patients were excluded from the study; including one foreign laborer who was deported after diagnosis, 11 patients with extrapulmonary tuberculosis, 38 misdiagnosed patients and 11 patients without any documented positive sputum smears or positive cultures.

# Results (II)

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- 421 patients, 311 male (73.9%) and 110 female (26.1%), were included in the analyses.
- Patient age at diagnosis ranged from 18 to 95 years, (mean 66 years), and the number of patients increased with age (13 below 25 years of age, 35 from 25 to 44 years of age, 110 from 45 to 64 years of age, and 263 above 64 years of age).

# Results (III)

	Medical center (n = 112)	Regional hospital (n = 155)	District hospital/ primary practitioners (n = 100)	Chest specialty hospital (n = 54)	<i>P</i> -value
<b>Diagnostic physician; n (%)</b>					< 0.001
Pulmonologist	76 (67.9)	118 (76.1)	67 (67.0)	53 (98.1)	
Non- pulmonologist	36 (32.1)	37 (23.9)	33 (33.0)	1 (1.9)	

# Results (IV)

<i>Quality of diagnosis; n (%)</i>	Medical center (n = 112)	Regional hospital (n = 155)	District hospital/ primary practitioners (n = 100)	Chest specialty hospital (n = 54)	<i>P</i> -value
<i>Sputum specimens for diagnosis</i>					< 0.001
<3 specimens	58 (51.8)	98 (63.2)	50 (50.0)	14 (25.9)	
≥3 specimens	54 (48.2)	57 (36.8)	50 (50.0)	40 (74.1)	

# Results (V)

<b>Timeliness</b> ( <i>mean ± SD</i> )	Medical center (n = 112)	Regional hospital (n = 155)	District hospital/ primary practitioners (n = 100)	Chest specialty hospital (n = 54)	<i>P</i> -value
Days between chest X-ray examination and the hospital visit (n = 415)	1.8 ± 6.0	1.8 ± 5.6	1.7 ± 3.4	1.0 ± 0.0	0.044
Days between the sputum examination and the hospital visit (n = 415)	4.9 ± 13.3	4.1 ± 8.2	4.8 ± 14.7	1.5 ± 2.9	< 0.001
<b>Healthcare institution delay</b> (n = 378)	31.0 ± 53.6	31.2 ± 70.4	25.4 ± 37.6	10.1 ± 18.3	< 0.001
Positive AFB smear (n = 235)	11.2 ± 16.2	13.4 ± 31.4	15.7 ± 30.6	4.7 ± 7.1	0.003
Negative AFB smear (n = 143)	69.9 ± 76.2	53.3 ± 95.5	44.3 ± 42.8	20.1 ± 27.0	0.001
<b>Laboratory diagnostic delay</b> (n = 415)	2.6 ± 2.1	4.5 ± 3.1	3.5 ± 2.6	2.4 ± 2.4	< 0.001

# Results (VI)

<i>Outcome; n (%)</i>	Medical center (n = 112)	Regional hospital (n = 155)	District hospital/ primary practitioners (n = 100)	Chest specialty hospital (n = 54)	<i>P-value</i>
Successful treatment (n= 421)					0.001
Yes	73 (65.2)	99 (63.9)	68 (68.0)	50 (92.6)	
No	39 (34.8)	56 (36.1)	32 (32.0)	4 (7.4)	
Fatality (n = 421)					0.002
Yes	31 (27.7)	50 (32.3)	28 (28.0)	3 (5.6)	
No	81 (72.3)	105 (67.7)	72 (72.0)	51 (94.4)	

# Multiple logistic regression for factors affecting the successful treatment

Variables	Reference group	Full model		Reduced model @	
		$\beta$	OR (95% CI)	$\beta$	OR (95% CI)
Age		-0.03	0.97 (0.96, 0.98)***	-0.03	0.97 (0.94, 0.98)***
<b>Gender</b>					
Female	Male	0.18	1.19 (0.72, 1.99)		
<b>Physician</b>					
Pulmonologist	Non-pulmonologist	0.54	1.72 (1.07, 2.77)*	0.55	1.74 (1.08, 2.79)*
<b>Institution</b>					
Chest Specialty Hospital	Other healthcare institutions	1.54	4.65 (1.61, 13.46)**	1.52	4.58 (1.58, 13.23)**
<b>Hosmer and Lemeshow</b>		X <sup>2</sup> =7.25		X <sup>2</sup> =8.57	

13 @ reduced model using forward substitution; \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

# Multiple logistic regression for factors affecting the successful treatment

Variables	Reference group	Full model		Reduced model <sup>a</sup>	
		$\beta$	OR (95% CI)	$\beta$	OR (95% CI)
Age		-0.04	0.96 (0.94, 0.98)***	-0.04	0.97 (0.94, 0.98)***
<b>Gender</b>					
Female	Male	0.29	1.33 (0.72, 2.47)		
<b>Pulmonologist at</b>					
Chest Specialty Hospital	Other healthcare institutions	1.44	4.23(1.45, 12.40)**	1.42	4.13 (1.41, 12.05)**
<b>Hosmer and Lemeshow</b>		X2=9.06		X2=11.96	

14 <sup>a</sup> reduced model using forward substitution; \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

# Multiple logistic regression for factors affecting the fatality rate

Variables	Reference group	Full model		Reduced model @	
		$\beta$	OR (95% CI)	$\beta$	OR (95% CI)
Age		0.06	1.06 (1.04, 1.08)***	0.06	1.06 (1.04, 1.08)***
<b>Gender</b>					
Female	Male	-0.12	0.89 (0.51, 1.55)		
<b>Physician</b>					
Pulmonologist	Non-pulmonologist	-0.36	0.70 (0.42, 1.162)		
<b>Institution</b>					
Chest Specialty Hospital	Other healthcare institutions	-1.54	0.21 (0.06, 0.73)*	-1.63	0.20 (0.06, 0.66)**
Hosmer and Lemeshow		X <sup>2</sup> =7.25		X <sup>2</sup> =4.40	

15 @ reduced model using forward substitution; \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

# Conclusion

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- Differences in quality of care exist among different types of healthcare institutions and among individual physicians.
  - Extensive education programs and implementation of practice guidelines for tuberculosis for medical staff at the institutions are strongly recommended
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Thanks for your attention