

Online Supplement

Scoring systems using chest radiographic features for the diagnosis of pulmonary tuberculosis in adults: A systematic review

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The online supplement contains in order:

1. Detailed search strategy for the systematic review
2. Table of the demographic characteristics of participants in the included studies
3. Table of the association of upper lobe opacities visualized on the chest radiograph and active pulmonary TB
4. Table of the association of the presence of a cavity visualized on the chest radiograph and active pulmonary TB
5. Table of performance characteristics of scoring systems, classified by income status of country of study
6. Forest plot of the diagnostic odds ratio for active pulmonary TB among all TB patients with a cavity visualized on the chest radiograph
7. Forest plot of the diagnostic odds ratio for active pulmonary TB among smear-negative TB suspects with a cavity visualized on the chest radiograph

1. Search strategy for the systematic review

a. NEW MEDLINE search strategy:

1. sensitiv:.mp.
2. diagnos:.mp.
3. di.fs.
4. 1 or 2 or 3
5. radiograph:.tw.
6. radiolog:.tw.
7. Mass Chest X-Ray/
8. chest x-ray.tw.
9. scor:.tw.
10. Radiography, Thoracic/
11. chest xray.tw.
12. 5 or 6 or 7 or 8 or 9 or 10 or 11
13. pulmonary tuberculosis.tw.
14. pulmonary tb.tw.
15. lung tuberculosis.tw.
16. lung tb.tw.
17. Tuberculosis, Lymph Node/
18. Tuberculosis, Miliary/
19. Tuberculosis, Multidrug-Resistant/
20. Tuberculosis, Pleural/
21. Tuberculosis, Pulmonary/
22. Mycobacterium tuberculosis/
23. miliary tuberculosis.tw.
24. tuberculous pleurisy.tw.
25. tuberculous pleural effusion.tw.
26. pleural tuberculosis.tw.
27. tuberculous lymphadenitis.tw.
28. lymph node tuberculosis.tw.
29. lymph node tb.tw.
30. miliary tb.tw.
31. pleural tb.tw.
32. 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31
33. 4 and 12 and 32

b. OLD MEDLINE/ MEDLINE in-process search strategy:

1. radiograph:.tw.
2. radiolog:.tw.
3. Mass Chest X-Ray/
4. chest x-ray.tw.

5. scor:.tw.
6. Radiography, Thoracic/
7. chest xray.tw.
8. 1 or 2 or 3 or 4 or 5 or 6 or 7
9. pulmonary tuberculosis.tw.
10. pulmonary tb.tw.
11. lung tuberculosis.tw.
12. lung tb.tw.
13. Tuberculosis, Lymph Node/
14. Tuberculosis, Miliary/
15. Tuberculosis, Multidrug-Resistant/
16. Tuberculosis, Pleural/
17. Tuberculosis, Pulmonary/
18. Mycobacterium tuberculosis/
19. miliary tuberculosis.tw.
20. tuberculous pleurisy.tw.
21. tuberculous pleural effusion.tw.
22. pleural tuberculosis.tw.
23. tuberculous lymphadenitis.tw.
24. lymph node tuberculosis.tw.
25. lymph node tb.tw.
26. miliary tb.tw.
27. pleural tb.tw.
28. 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27
29. 8 and 28

c. EMBASE search strategy:

1. specificity.tw.
2. predict:.tw.
3. di.fs.
4. 1 or 2 or 3
5. radiograph:.tw.
6. radiolog:.tw.
7. chest x-ray.tw.
8. scor:.tw.
9. thorax radiography/
10. chest xray.tw.
11. 5 or 6 or 7 or 8 or 9 or 10
12. pulmonary tuberculosis.tw.
13. pulmonary tb.tw.
14. lung tuberculosis.tw.
15. lung tb.tw.

16. tuberculous lymphadenitis/
17. miliary tuberculosis/
18. multidrug resistant tuberculosis/
19. tuberculous pleurisy/
20. lung tuberculosis/
21. Mycobacterium tuberculosis/
22. miliary tuberculosis.tw.
23. tuberculous pleurisy.tw.
24. tuberculous pleural effusion.tw.
25. pleural tuberculosis.tw.
26. tuberculous lymphadenitis.tw.
27. lymph node tuberculosis.tw.
28. lymph node tb.tw.
29. miliary tb.tw.
30. pleural tb.tw.
31. 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 30
32. 4 and 11 and 31

d. Web of Science search strategy:

#1 Topic=(pulmonary tuberculosis) OR Topic=(pulmonary tb) OR Topic=(lung tuberculosis) OR Topic=(lung tb) OR Topic=(tuberculous lymphadenitis) OR Topic=(tb lymphadenitis) OR Topic=(tb lymph node) OR Topic=(miliary tuberculosis) OR Topic=(miliary tb) OR Topic=(multidrug resistant tb) OR Topic=(multidrug resistant tuberculosis) OR Topic=(pleural tuberculosis) OR Topic=(pleural tb) OR Topic=(tuberculous pleurisy) OR Topic=(tb pleurisy) OR Topic=(mycobacterium tuberculosis)

#2 Topic=(sensitiv*) OR Topic=(specific*) OR Topic=(diagnos*) OR Topic=(accura*) OR Topic=(predict*) OR Topic=(reliab*) OR Topic=(reproducib*)

#3 TS=(radiograph*) OR TS=(radiolog*) OR TS=(chest x-ray) OR TS=(chest xray) OR TS=(scor*)

#4 #3 AND #2 AND #1

2. Demographic characteristics of participants in the included studies

Study	Age (years)	No. of Males (%)	No. of Persons Living with HIV (%)	Patients with Active TB (%)
Studies that included all TB suspects				
Bock et al (1996) ¹⁵⁺	mean 41	296 (79)	230 (61.0)	53 (14.1)
El-Solh et al (1997) ^{16##}	mean(SD) PLWH: 36.6(0.4) non-PLWH: 50.4(1.2)	NR	316 (56.1)	47 (8.3)
El-Solh et al (1999) ¹⁷	NR	NR	66 (55.5)	11 (9.2)
Moran et al (2009) ^{18##}	median (IQR) 48(38-63)	3567 (63)*	1058 (20.8)	224 (4.4)
Mylotte et al (1997) ¹⁹	mean(SD) 44(16)	NR	129 (59.0)	8 (3.6)
Solari et al (2008) ²⁰	median 33	222 (64.4)	45(13.0)	109 (31.6)
Studies that included smear-negative TB suspects				
	mean (SD)			
Lagrange-Xelot et al (2010) ²¹	43 (14.0)	94 (70)	60 (40.0)	26 (19.0)
Soto et al (2008) ²²	NR	166 (63.4)	28(10.9)**	27 (10.3)
Soto et al (2011) ²³	41.4 (17.2)	370 (55.8)	98 (24.0) [#]	184 (27.8)
Wisnivesky et al (2000) ²⁵	cases – 40 (2) controls – 40 (2)	82 (73.2)	NR	56 (50)
Wisnivesky et al (2005) ²⁴	46.3 (11.9)	285 (55.2)	362(70.0)	19 (3.7)
Study that excluded PLWH				
Rakoczy et al (2008) ²⁶	cases – 60 controls – 51.8	cases - 33(67) controls – 29 (59)	0	33 (11.8)

IQR, interquartile range; NR, not reported; PLWH, persons living with HIV

* Sex not documented in 1.4% patients

** 6 patients refused testing

[#] 255 patients refused testing

^{##} The demographic characteristics represent those of the included subjects in the combined derivation and validation cohort

⁺ The demographic characteristics represent those of the eligible participants

3. Association of upper lobe opacities visualized on the chest radiograph and active pulmonary TB

Study	OR	95% CI
Studies that included all TB suspects		
Bock et al (1996) ¹⁵	5.14	2.56,10.33
	10.1	5.29,19.3
El-Solh et al (1997) ¹⁶ *	18	5.47,59.36 when adenopathy also present
El-Solh et al (1999) ¹⁷	2.38	0.67,8.41
Moran et al (2009) ¹⁸ *,#	7.7	5.9,10
Solari et al (2008) ²⁰	5.15	3.03,8.75
Studies that included smear-negative TB suspects		
Lagrange-Xelot et al (2010) ²¹	3.83	1.52,9.6
Soto et al (2008) ²² **	4.81	1.93,11.92
Soto et al (2011) ²³ **	2.47	1.71,3.57
Wisnivesky et al (2000) ²⁵ +	9.07	2.5,32.9
Wisnivesky et al (2005) ²⁴ +	3.96	1.57, 9.98

* Reported “upper zone disease”

**Reported “apical infiltrates”

+ Reported “upper lobe consolidation”

The study reported relative risks (RR) as the measure of association

4. Association of the presence of a cavity visualized on the chest radiograph and active pulmonary TB

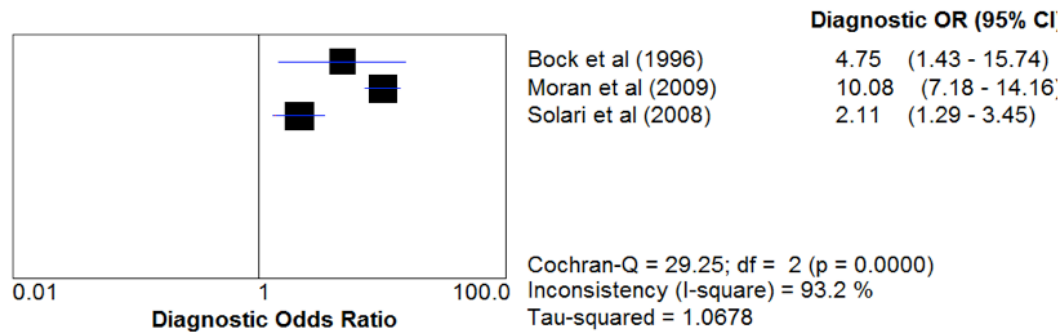
Study	OR	95% CI
Studies that included all TB patients		
Bock et al (1996) ¹⁵	4.75	1.43,15.74
Moran et al (2009) ^{18*}	7.68	5.88,10.05
Solari et al (2008) ²⁰	2.11	1.25,3.55
Studies that included smear-negative TB suspects		
Lagrange-Xelot et al (2010) ²¹	25.66	6.42,102.69
Soto et al (2008) ²²	1.97	0.76,4.87
Wisnivesky et al (2000) ²⁵⁺	2.04	0.7,5.96

*The study reported relative risks (RR) as the measure of association

5. Performance characteristics of scoring systems, classified by income status of country of study

	Median sensitivity (range)	Median specificity (range)	Number of studies
Studies that included all patients with possible PTB			
Middle- and low- income	93	42	1 study ²⁵
High-income	96 (81-100)	57 (49-72)	5 studies with sensitivity data ^{20,21,22,23,24} , 4 studies with specificity data ^{21,22,23,24}
Studies that only included smear- negative subjects with possible PTB			
Middle- and low- income	95 (93-98)	32 (14-50)	2 studies ^{27,28}
High-income	96 (95-98)	35 (21-46)	3 studies ^{26,29,30}

6. Diagnostic odds ratio for active pulmonary TB among all TB suspects with a cavity visualized on the chest radiograph

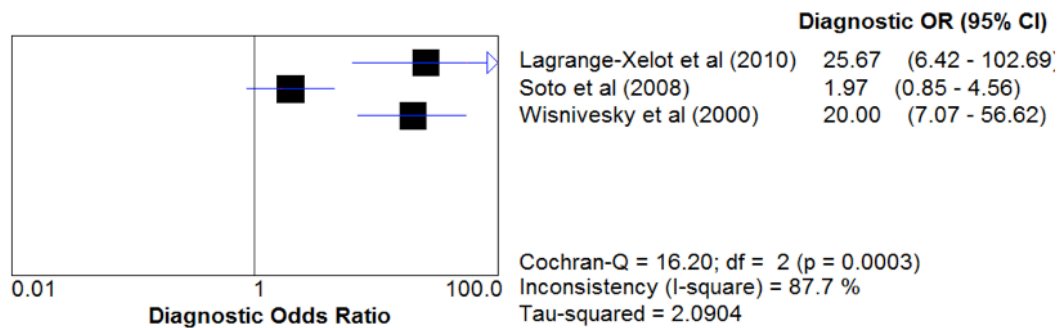


The size of the square is proportional to the sample size of the study such that larger studies are represented by larger squares.

The lines represent the confidence intervals around the estimates.

Pooling was not performed, as there was considerable heterogeneity.

7. Diagnostic odds ratio for active pulmonary TB among smear-negative TB suspects with a cavity visualized on the chest radiograph



The size of the square is proportional to the sample size of the study such that larger studies are represented by larger squares.

The lines represent the confidence intervals around the estimates.

Pooling was not performed, as there was considerable heterogeneity.