



Use of Systemic Inflammatory Markers to Replace Chest Radiography in Clinical Decision Making for Adolescents with Tuberculosis

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Overview

- 300,000 adolescents 10 to 14 newly develop tuberculosis disease (TB) globally¹
- The *SHINE* trial showed that among children aged <16 with non-severe TB defined radiographically, 4-month regimens are non-inferior to and cost less than 6-month regimens
- Chest X-ray (CXR) was used to classify patients with non-severe TB and thus eligible for shortened regimens in the *SHINE* trial²
- CXR is not always available in high TB burden countries
- Current World Health Organization (WHO) guidelines do not provide evidence-based alternatives to identify patients eligible for 4-month regimens when CXR is not available

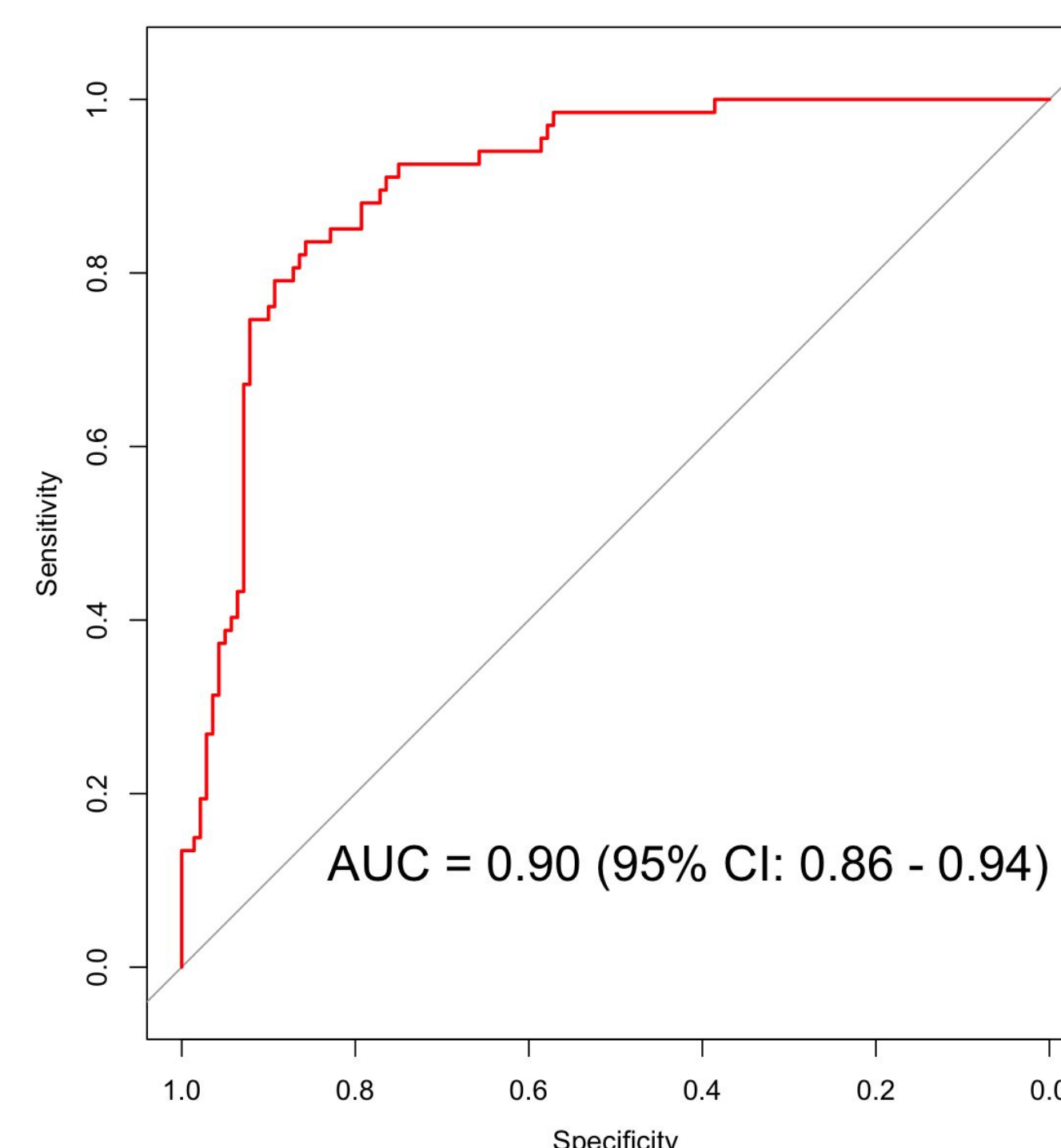
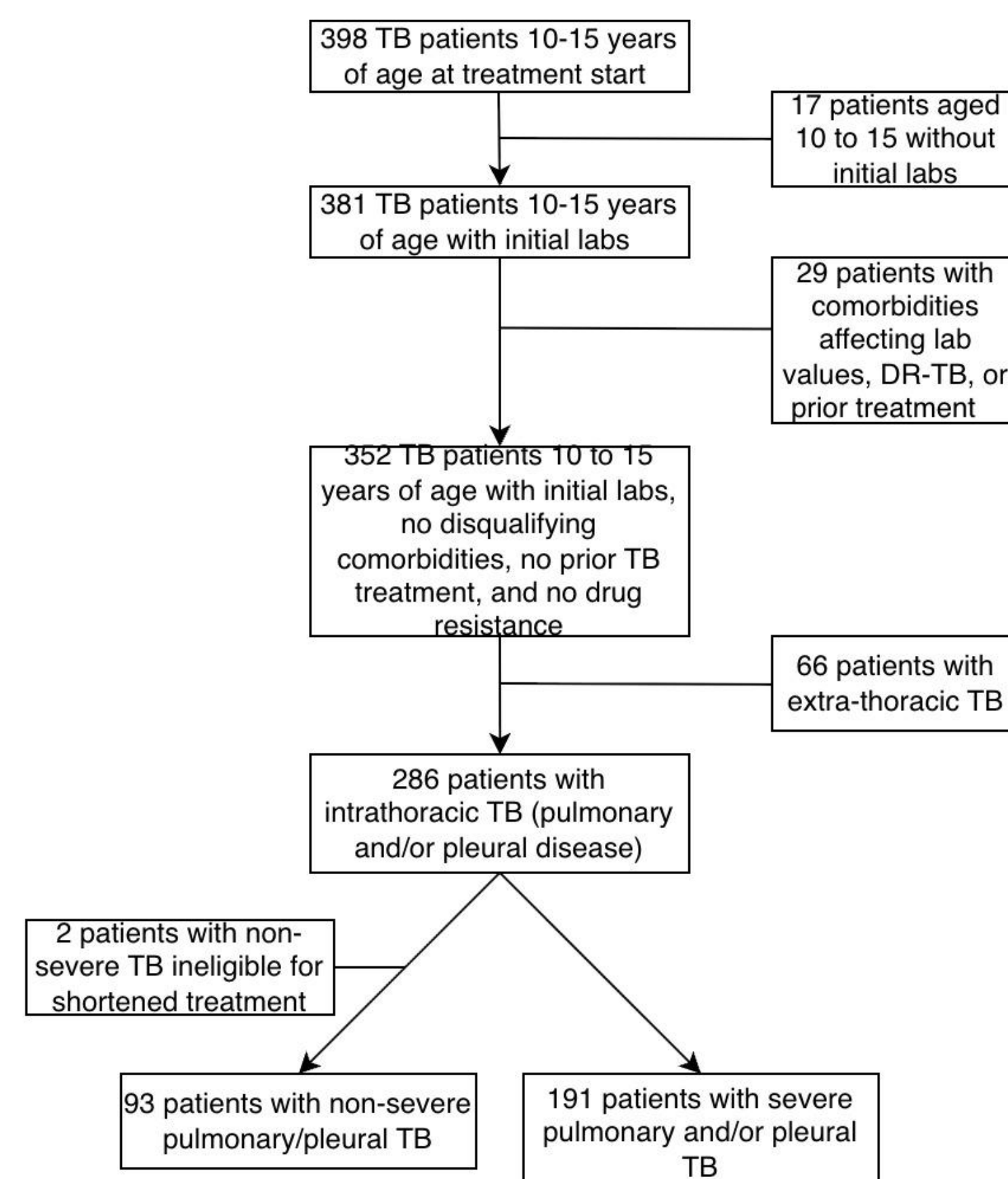
Aims

- We aim to construct a model using laboratory values, age and comorbidities to distinguish severe vs non-severe intrathoracic TB for determination of duration of treatment regimen
- Ideally this model would be used when CXR is not available

Methods

- We conducted a retrospective cohort study of all patients aged 10 to 15 years who initiated treatment for intra-thoracic TB from January 1, 2013 to December 31, 2023 at the Hospital General de Niños Pedro de Elizalde in Buenos Aires, Argentina
- Patients' CXRs were read by experienced pediatric pulmonologists. We used patient CXR readings to categorize patients as having drug-susceptible “severe” vs “non-severe” disease per WHO guidelines³
- We conducted univariable logistic regressions to identify potential predictors of non-severe disease
- We identified the strongest predictors based on marginal R² from univariable models for our multivariable regression. We then used multiple imputation by chained equations to impute variables with <25% missingness. Backwise stepwise regression was used to select the predictors for our final model.
- Lastly, we calculated AUC for our final model

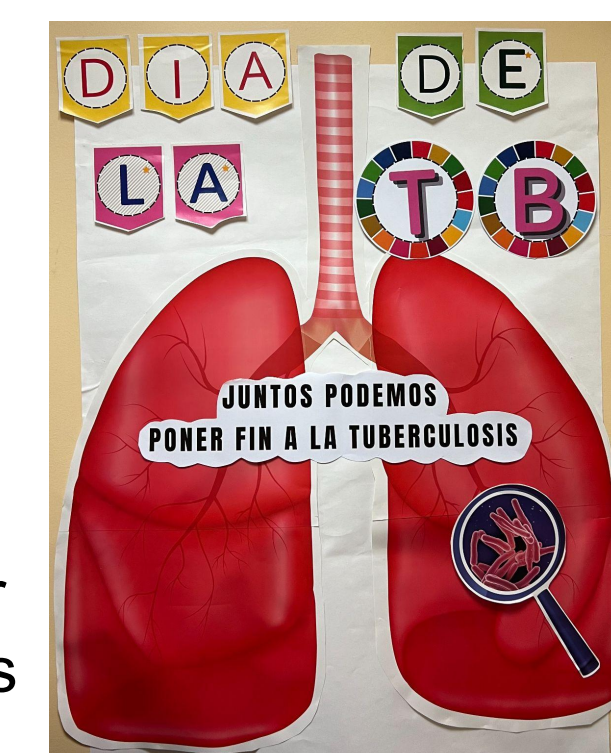
Results



Predictor	Mean (SD) or n (%)		OR (95% CI) of non-severe TB	
	Non-severe	Severe	Unadjusted	Adjusted
Age, years	12.8 (1.62)	13.8 (1.51)	0.69 (0.58, 0.81)	0.70 (0.54, 0.90)
WBC count, cells/μL	7.90 (2.02)	9.03 (3.26)	0.86 (0.77, 0.95)	—
Neutrophil, %	53.2 (11.0)	67.6 (10.5)	0.64 (0.54, 0.74)	0.95 (0.91, 0.99)
Platelet count, cells/μL	319,000 (81,000)	394,000 (116,000)	0.992 (0.989, 0.995)	—
Hematocrit, %	39.3 (4.35)	35.2 (4.65)	1.29 (1.19, 1.40)	—
Hemoglobin, g/dL	13.1 (1.13)	11.4 (1.59)	2.68 (2.1 - 3.6)	—
ESR, mm/hr	18.6 (15.8)	63.7 (33.8)	0.93 (0.91, 0.95)	0.93 (0.91, 0.95)
Sex: Female	43 (47.1)	104 (53.9)	0.77 (0.46, 1.26)	—
HIV: Positive	1 (1.10)	3 (1.55)	—	—
HIV: Unknown	24 (26.4)	3 (1.55)	22.6 (7.58, 97.1)	—
Asthma	12 (13.2)	19 (9.84)	1.39 (0.63, 2.97)	—
Overweight	3 (3.30)	11 (5.70)	—	—
Mental health condition	0 (0)	6 (0)	—	—

Conclusions

- A model using baseline ESR, neutrophil %, and age can be used to determine probability of non-severe TB with a high degree of discrimination with an AUC of 90.3% in a sample of Argentinian adolescents aged 10 to 15 years
- Next steps include development of cut-off values that can be used by clinicians to estimate probability of non-severe TB and validation of our clinical prediction rule in adolescents on data sets of adolescents from Peru and/or South Africa



References

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