

Ying C. Ku, DO; Ryan Khalaf, BS; Riley Marlar, DO; Mychajlo S. Kosyk, MD, MPH; Diane Jo, MS, R'ay Fodor, BA; Mazen Al-Malak, MD; Lianne Mulvihill, MD; Jacob Lammers, DO, Jose Reyes, BS; Brian Figueroa, MD, Antonio Rampazzo, MD, PhD, Bahar Bassiri Gharb, MD, PhD

Department of Plastic and Reconstructive Surgery, Cleveland Clinic, Cleveland, OH

Background

- Septic wrist presents a diagnostic challenge due to its similar clinical presentation to other diseases (gout/pseudogout, arthritic flare, tenosynovitis, etc.).
- There are no laboratory values pathognomonic for septic wrist.
- This study aims to create a septic wrist AI prediction model and develop a score-based risk assessment tool.

Methods

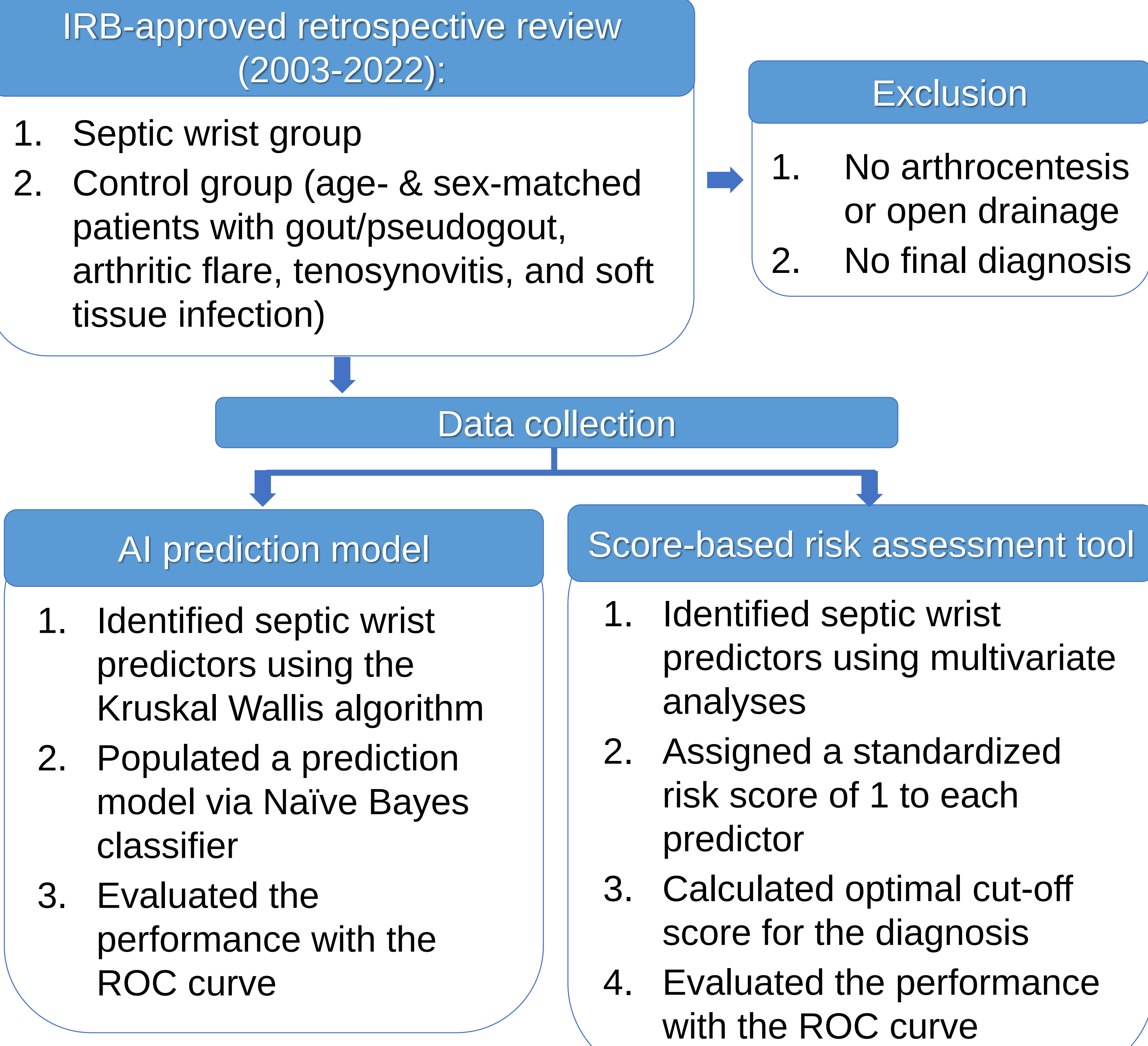


Figure 1. Flow Chart for Research Method. ROC (receiver operating characteristic)

Results

	Septic wrist (n=95)	Nonseptic wrist+ (n=79)
Age (years)	56.5 ± 16.9	65.7 ± 13.3
Sex	33F, 62M	24F, 55M
Hospitalization	7 [10] days	4 [6] days
Follow-up	1 [3] months	0.5 [2] months

Table 1. Results of Data Collection. + gout/pseudogout, tenosynovitis, cellulitis, abscesses, ligamentum injury, and arthritic flare.

Score-based risk assessment tool

Predictor	OR	95% CI	P
No history of gout/pseudogout	18.2	1.84 - 181.14	0.01*
Multi-joint involvement	21	1.23 - 358.27	0.04*
Positive blood culture	40.9	0.98 - 1705.67	0.05*
Absence of synovial crystals	0.07	0.004 - 1.32	0.08*

Table 2. Predictors of Septic Wrist Based on Multivariate Analyses. *statistical significance.

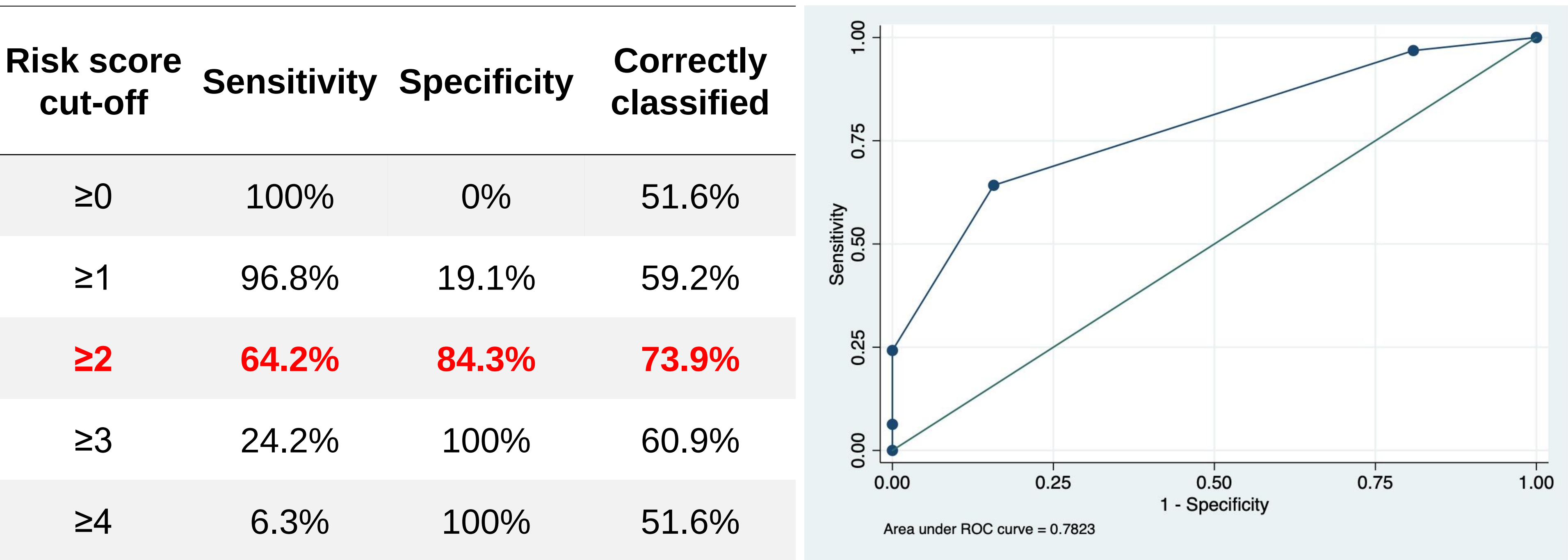


Figure 2. Risk Assessment Tool for Septic Wrist Diagnosis. Each predictor is associated with a score of 1, resulting in a total risk score ranging from 0 to 4 (left image). Classifying patients with septic wrist at a score of ≥2 yields optimized sensitivity of 64%, specificity of 84%, and AUC of 0.78 (right image).

Results

AI prediction model

Predictor	Kruskal Wallis Score**
No crystals	13.66
Positive blood culture	11.09
Multi-joint involvement	7.96
Age	6.14
History of septic arthritis	3.83
IV drug use	3.22
Penetrating trauma	3.17

Table 3. Predictors of Septic Wrist Based on Kruskal Wallis algorithm. **A higher score indicates a stronger significance of association.

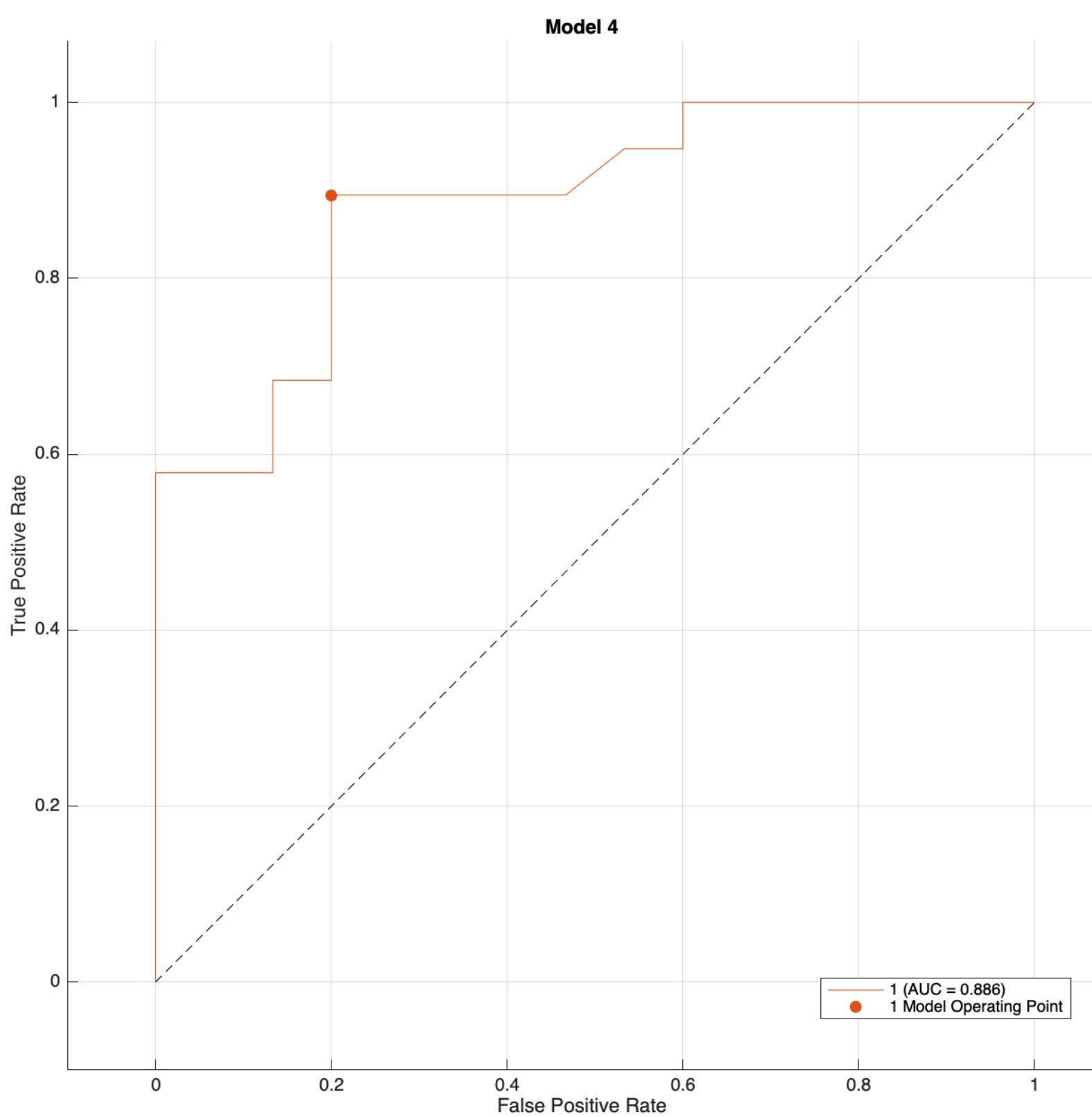


Figure 3. Performance of the Naïve Bayes Classifier-Generated Prediction Model. The inclusion of 7 predictors results in an AUC of 0.886.

Conclusions

- Both the AI prediction model and score-based risk assessment tool have potential to aid in clinical decision-making in cases of suspected septic wrist.
- The most significant predictors of septic wrist are multi-joint involvement, absence of synovial crystals, and positive blood culture.