

# EVALUATING AND REFINING AN ALGORITHMIC APPROACH TO PREHOSPITAL PELVIC BINDER APPLICATION

**Authors:** Jacob, M, Lilienfeld, BA; Landon, D, Hamilton, PhD; Zoe, Draper; Cordelie, E, Witt, MD, MPH, FACS; Julie, Dunn, MD, MS, FACS<sup>5</sup>

## BACKGROUND

- Pelvic binders are an effective first-line treatment to help reduce life-threatening intrapelvic hemorrhage in the setting of traumatic pelvic fracture
- Pelvic fractures may be missed in the prehospital setting when relying on physical exam alone, leading to an underuse of pelvic binders.
- Nguyen et. al. (2023) proposed an algorithmic criteria to standardize decision making regarding pre-hospital pelvic binder application in order to improve pre-hospital pelvic binder usage.



## OBJECTIVES

- Our study aims to evaluate and refine the algorithmic approach to prehospital pelvic fracture recognition proposed in Nguyen et al. to optimize prehospital pelvic binder use.

## THE NGUYEN CRITERIA

Pre-hospital pelvic binder should be applied if two or more pelvic fracture risk factors are met:

Pelvic Fracture Risk Factors  
Blunt Type of Injury  
Systolic Blood Pressure < 90 mmHg  
Frontal/Side Vehicle Impact Location  
Non-Front Seat Passenger

## METHODS

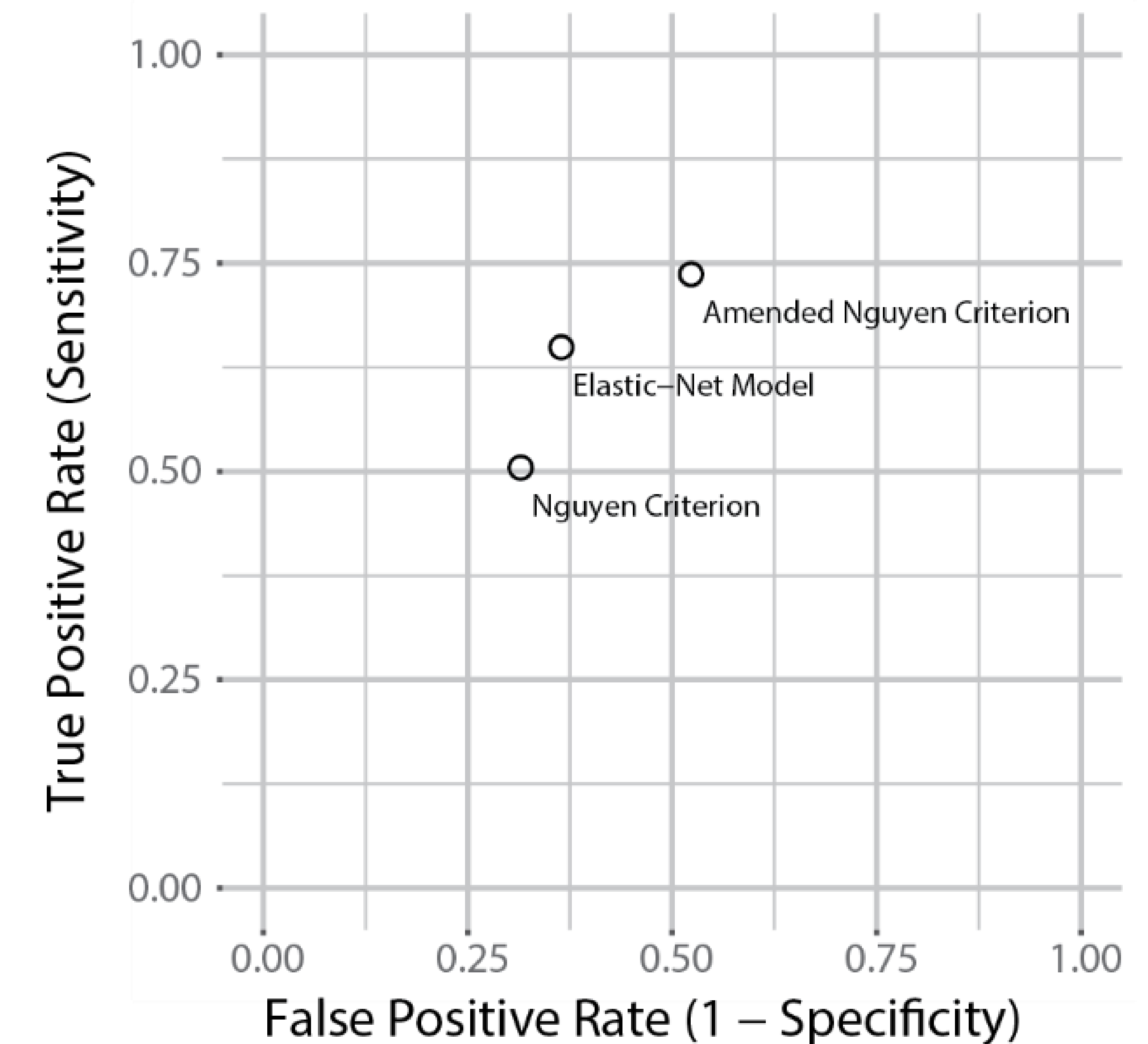
- This is a single institution retrospective case-control study using trauma patients who were treated at an Level 1 Trauma center serving suburban and rural populations
- Our study includes two cohorts:
  - Patients with complex pelvic fractures.
  - Patients without complex pelvic fractures who are age-, height-, weight-, sex-, and Injury Severity Score-matched.

## RESULTS

- 114 patients met inclusion criteria for the complex pelvic fracture cohort and 107 matched into the control cohort.
- The Nguyen et al. criteria had a **50% sensitivity and a 69% specificity** for identifying complex pelvic fractures and identified patients with significantly higher injury severity scores.
- Using the variables identified by an elastic-net regression model to predict pelvic fracture, the Nguyen Criteria was amended to additionally include any passenger in MVC, pedestrian struck by automobile, and a first pre-hospital heart rate >100 beats per minute.
- **The Amended Nguyen Criteria had a sensitivity of 74% and a specificity of 48%.**

Variables predictive of prehospital pelvic fracture

	Odds Ratio
<b>Motor vehicle impact location</b>	
Front seat passenger	1.08
Driver side impact	1.02
Rear impact	0.58
Rollover impact	0.80
<b>Mechanism of injury</b>	
Pedestrian vs. vehicle	1.17
Bicycle crash	0.49
<b>First prehospital vitals</b>	
SBP < 90	1.60
Pulse > 100	1.20
GCS < 13	0.96



## CONCLUSIONS/DISCUSSION

- The Nguyen Criteria underperformed in terms of sensitivity for recognizing pre-hospital pelvic fractures within our sample.
- We recommend an amended criteria in which a prehospital **pelvic binder should be applied in patients with two or more of the following factors: blunt trauma, front or side impact MVC, passenger in MVC, pedestrian vs. automobile, and a first pre-hospital systolic blood pressure <90mmHg OR a first pre-hospital heart rate >100.**
- The amended criteria favors sensitivity at the cost of specificity given the high risk of intrapelvic hemorrhage and mortality with pelvic fractures and the low complication rate of pelvic binder placement