Accuracy of Clinicians' Prediction of Injuries in Blunt Trauma Patients in the Emergency Department

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Introduction

- There is little data regarding the accuracy of a clinician's ability to predict injuries in blunt trauma patients. One trial[1] of trauma surgeons' ability to predict injuries based on history and physical alone showed that they would have missed nearly half of injuries detected on imaging in severe trauma.
- The decision to image or not in blunt trauma patients should be guided by an understanding of how accurate history and physical exam are in predicting injury.

Hypothesis: Physicians have a poor accuracy in detecting specific injuries prior to imaging in blunt trauma patients.

Methods

Population
- A convenience sample of 561 blunt trauma patients were prospectively enrolled upon ED arrival to 2 U. S. Level I trauma centers, one urban and one community, and followed to hospital discharge.

Aims
- Treating physicians were asked before imaging to predict any injuries. Their predictions were compared with any injuries detected by imaging.
- Additionally, the effect of medication or physiologic variables on provider accuracy was assessed.

Measurements
- Sensitivity, specificity, PLR, NLR, PPV, NPV were calculated with 95% confidence intervals for the primary aim.
- The effect of medication and physiologic variables was calculated by simple proportion of correct vs. incorrect injury prediction overall.

Results

Demographics (n=561)	
Sex	41% Male, 59% Female
Race	53% African-American, 37% White, 10% Other
Age	56 ± 21.3 years
Facility	62% HFH 38% WBH

Figure 1 depicts the demographics of the patient population between the two enrollment sites: Henry Ford Hospital & William Beaumont Hospital, Royal Oak
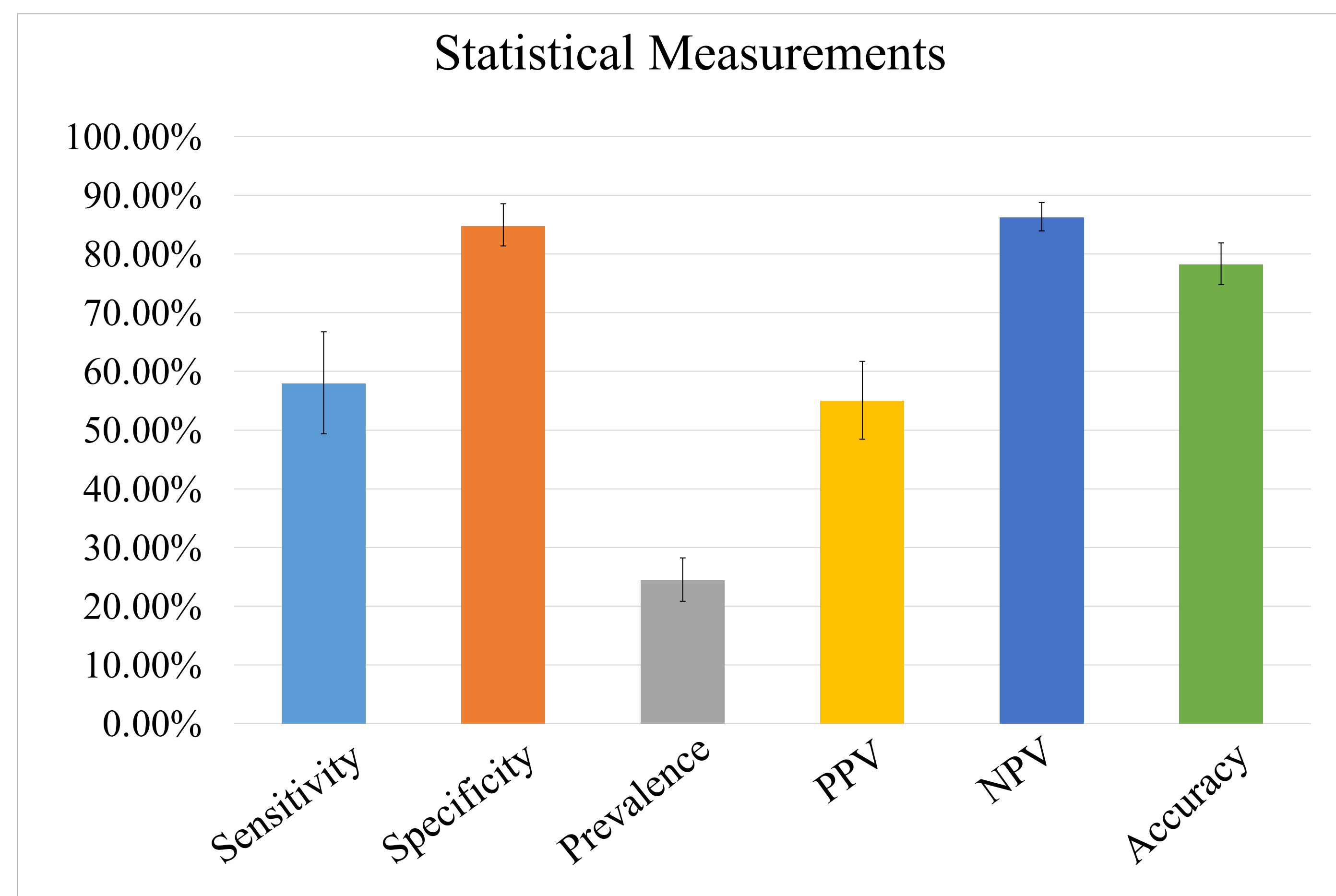

Figure 2 demonstrates the statistical tests used to measure physician's prediction of injuries

Variable	Response	Inaccurate (N= 119)	Accurate (N= 426)	p-value
Anticoagulant	No	106 (92%)	370 (90%)	0.448
	Yes	9 (8%)	42 (10%)	
Anti-platelet	No	88 (76%)	304 (73%)	0.598
	Yes	28 (24%)	110 (27%)	
Beta Blocker	No	101 (86%)	347 (84%)	0.478
	Yes	16 (14%)	68 (16%)	
CCB	No	104 (89%)	374 (90%)	0.697
	Yes	13 (11%)	41 (10%)	
Midodrine	No	117 (100%)	410 (99%)	0.581
	Yes	0 (0%)	4 (1%)	

Figure 3 demonstrates effect of medications on the accuracy of physician predictions

Discussion

- Physicians predicted specific injuries with a PLR of 3.79 and a NLR of 0.5.
- Physicians correctly predicted injuries found on imaging for 1 in 1.8 patients.
- Physicians correctly predicted the absence of injuries in 1 in 1.2 patients.
- Prevalence of major trauma (ISS>15) was 1.6% for this population.
- No significant difference was detected in prediction accuracy due to age, demographics, or physiologic variables.
- Due to the insignificant p-values for anticoagulant (0.448), anti-platelet (0.598), beta-blocker (0.478), CCB (0.697), and Midodrine (0.581), there is insufficient evidence of a relationship between medication/physiologic variables and specific injury accuracy.

Limitations
- Physician injury prediction data was self reported making it difficult to verify results.
- This research uses data from only two hospital sites, and uses convenience sampling.

Conclusion

- Physicians are able to detect specific injuries based on history and physical exam with poor sensitivity and fair specificity.
- There was no significant difference in physicians' predictions due to demographic or physiologic factors in this population.
- Due to the lack of existing data, further research is needed to evaluate the value of injury prediction prior to imaging in blunt trauma patients.

References

[1] Beal A, Ahrendt M, Irwin E, Lyng J, Turner S, Beal C, Byrnes M, Beilman G. (2016). Prediction of blunt traumatic injuries and hospital admission based on history and physical exam. World J Emerg Surg. 2016; 11(1): 46.

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