EVMS Emergency Medicine Journal Club

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Citation: Appelboam A et al. Elbow extension test to rule out elbow fracture: Multicentre, prospective validation and observational study of diagnostic accuracy in adults and children. *BMJ* 2008 Dec 9; 337:a2428.

CRITICAL REVIEW FORM FOR A CLINICAL PREDICTION RULE

GUIDE	COMMENTS
I. Is this a newly derived prediction rule? (Level IV) Level IV= Rules that need further evaluation before they can be applied clinically; derived but not validated or have only been validated in split samples, large retrospective databases, or by statistical techniques	
1. Were the outcomes and clinical predictors clearly defined and clinically sensible?	The outcome were either the presence of an elbow fracture, or no evidence of poor healing at 7-10 s/p injury
2. Were all-important predictors assessed in the derivation of the prediction guide?	No. The study did not account for, nor subdivide elbow pain based on mechanism of injury. Moreover, it did not address presenting signs/symptoms in the patient (i.e. ecchymosis, deformity, neurovascular status, point tenderness, etc.). It simply looked at pain with full extension of the elbow. It did not incorporate pain with other motion of the upper extremity/wrist outside of full extension.
3. Was validation restricted to the use of split samples, large retrospective databases, or by various statistical techniques?	The validation was restricted to various statistical techniques and split samples (adult vs pediatric); however, the sample were not splint over time (i.e. repeated at a later period to validate results).
II. Has the rule been validated? (Level II or III) Level II= Rules that can be used in various settings with confidence in their accuracy; Demonstrated accuracy in either one large prospective study including a broad spectrum of patients and clinicians, or validated in several smaller settings who differ from one another Level III= Rules that clinicians may consider using with caution and only if patients in the study are similar to those in your clinical setting; These rules have been validated in only one narrow prospective sample.	
1. Did validation include prospective studies on several different populations from that used to derive it (II), or was it restricted to only one population (III)?	Level III- the study was restricted only to the population of southwest London, England. Although it was done across 5 centers, the population demographics were not defined in the study, and the limited geography suggests a homogenous population. Moreover, the study only incorporated one prospective sample.

2. Was there appropriate blinding of those assessing the predictors and those assessing the outcome event?	No. The clinicians were *not* blinded, as they were the ones to determine clinically if there was a +/- straight elbow test. Radiologists were not completely blinded as well since, in the adult population, only patients with a + test had radiographs obtained (no control against people with – test); in the pediatric population, radiographs were still up to the discretion of the examiner. Orthopedists were used as the "gold standard" from follow up evaluation.
3. What were the sensitivity, specificity, positive and negative predictive values, likelihood rations, relative risks or absolute outcome rates?	Values for fractures (combined Adults and Children) Sensitivity- 96.8 (95.0-98.2) Specificity- 48.5 (45.6-51.4) PPV- 45.8 (45.6-48.7) NPV- (7.2 (95.5-98.3) +LR- 1.88 (1.78-1.99) -LR- 0.06 (0.04-0.10) RR- not calculated in article Absolute outcome rates- not calculated in article
III Has an impact analysis demonstrated change in clinical behavior as a result of using the rule? (Level I) Level I= Rules that can be used in a wide variety of settings with confidence that they can change clinician behavior and improve patient outcomes; At least one prospective validation in a different population and one impact analysis, demonstrating change in clinician behavior with beneficial consequences	
No- study has not been applied to a wide variety of clinical settings nor have there been multiple studies to further validate the outcomes. There has also not been a study to demonstrate impact analysis.	

Clinical Bottom Line: The study may serve as the first step in the development of a clinical prediction rule to determine the need for radiographs following acute elbow injury. However, it has not been tested and validated in enough clinical settings to rise to the standards set by other prediction rules, such as the Ottawa Ankle rules, NEXUS criteria, etc. Further prospective studies in varied clinical settings as well as impact analysis would be required to gain greater validation before a change in clinical behavior/practice may occur.