Development of a Prediction Model for Identification of High-Cost Sports Injury Cases

Kelly M. Tucker MS, ATC, Melody A. Mullis MS, ATC, Gary B. Wilkerson, EdD, ATC, Scott L. Bruce, MS, ATC

BACKGROUND AND PURPOSE
- College and university athletic programs spend thousands of dollars on student-athletes’ medical costs each year.
- ACL injuries among 15-24 year-old athletes cost $1 billion annually in the US, approximately $17,000 per injury.
- Athletes who possess elevated injury risk prior to sport participation probably impose greater injury treatment costs.
- NCAI-BOCS football programs incurred $500,000 of medical expenses associated with 2008 bowl games.
- Deficiency in the performance capabilities of the core musculature appear to increase risk for sprains or strains.
- Other injury risk factors include high exposure to game conditions and the existence of low back dysfunction.
- Strongest predictors of high-cost status among various sports may or may not differ from predictors of injury occurrence.
- The purpose of this study was to develop a prediction model for identification of athletes who are likely to incur high treatment costs on the basis of injury history, performance tests, joint function ratings, and other relevant characteristics.

SUBJECTS AND PROCEDURES
- ‘191 NCAA Division I athletes who participated in eleven different sports during the 2011-2012 academic year.
- Height: 1.79 m; weight: 83.31 ± 22.12 kg.
- Electronic documentation of all occurrences of musculoskeletal injury that resulted from sport participation.
- Medical insurance claim review for tabulation of secondary insurance payments paid by university for each athlete.
- Costs related to treatments administered in university athletic training facility not included in the analysis.
- Foot and Ankle Ability Measure
- National Center for Injury Prevention and Control.
- Height: 1.79
- Deficiency in the performance capabilities of the core musculature appear to increase risk for sprains or strains
- Foot and Ankle Function Survey (FAAM) and specific function/disability surveys.

RESULTS
- Criterion for prediction of High-Cost status for football players: ≥ 2 of 3 factors (Tables 1-2 and Figure 1)
- Total football injury-related secondary costs for 85 players: $24,437.
- Among 24 players predicted to be High-Cost (average of $88 per player): 42% (1024) incurred cost ≥ $100.
- Among 59 players predicted to be Low-Cost (average of $146 per player): 90% (633) incurred cost < $100.
- Players predicted to be High-Cost generated 4.5 X more cost than those predicted to be Low-Cost.
- Criterion for High-Cost status for non-football athletes: ≥ 2 of 3 factors (Tables 3-4 and Figure 2)
- Total non-football injury-related secondary costs for 108 athletes (10 sports): $28,122.
- Among 16 athletes predicted to be High-Cost (average of $574 per player): 44% (7/16) incurred cost ≥ $100.
- Among 92 athletes predicted to be Low-Cost (average of $206 per player): 83% (76/92) incurred cost < $100.
- Players predicted to be High-Cost generated 2.8 X more cost than those predicted to be Low-Cost.
- Total secondary costs paid by university for 191 athletes: $52,559.
- Athletes predicted to be High-Cost generated 3.4 X more cost than those predicted to be Low-Cost.

CONCLUSIONS
- Both the football and non-football prediction models provided much better specificity than sensitivity.
- Better for identification of athletes who are unlikely to generate high secondary insurance costs than those who will.
- Cost versus Low
- Specificity > Sensitivity
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REFERENCES