

AAP National Conference & Exhibition 2022
Section on Orthopaedics-POSNA Young Investigator Awards

The Reliability of the Modified Fels Knee Skeletal Maturity System

Ryan J. Furdock, MD; Kristie J. Sun, BA; Bryan O. Ren, MD; Matthew Folkman, BS; Michael P. Glotzbecker, MD; Jochen P. Son-Hing, MD, FRCSC; Allison Gilmore, MD; Christina K. Hardesty, MD; R. Justin Mistovich, MD, MBA; Raymond W. Liu, MD

Rainbow Babies and Children's Hospital, Case Western Reserve University, Cleveland, OH

DOI: 10.55275/JPOSNA-2023-692



Potpourri

Recipient: Ryan J. Furdock, MD

Abstract

Background: The recently described Modified Fels knee skeletal maturity system (mFels) has proven utility in prediction of ultimate lower extremity length in modern pediatric patients. It also has potential applications to many other clinical scenarios. mFels users evaluate chronological age, sex, and 7 AP knee radiographic parameters to produce a skeletal age estimate. Our group developed a free mobile application to minimize the learning curve of mFels radiographic parameter evaluation. We sought to identify the reliability of mFels for new users.

Methods: 5 pediatric orthopaedic surgeons, 5 orthopaedic surgery residents, 3 orthopaedic nurse practitioners, and 5 medical students completely naïve to mFels each evaluated a set of 20 pediatric AP knee radiographs with the assistance of the “What’s the Skeletal Maturity?” mobile application. They were not provided any guidance regarding mFels beyond the instructions and examples imbedded in the app itself. The results of their radiographic evaluations and skeletal age estimates were compared to those of the mFels developers. Inter-rater reliability analyses utilized the Phi coefficient, Spearman’s rho, and intraclass correlation coefficient as appropriate.

Results: Averaging across participant groups, inter-rater reliability for each mFels parameter ranged from 0.73 to 0.91. Inter-rater reliability of skeletal age estimates was 0.98. Regardless of group, skeletal age estimation reliability began to improve by the fourth x-ray measured, reaching steady proficiency by the 10th x-ray measured (Figure 1).

Conclusion: mFels is a highly reliable means of skeletal maturity evaluation. No special instruction is necessary for first time users at any level to utilize the “What’s the

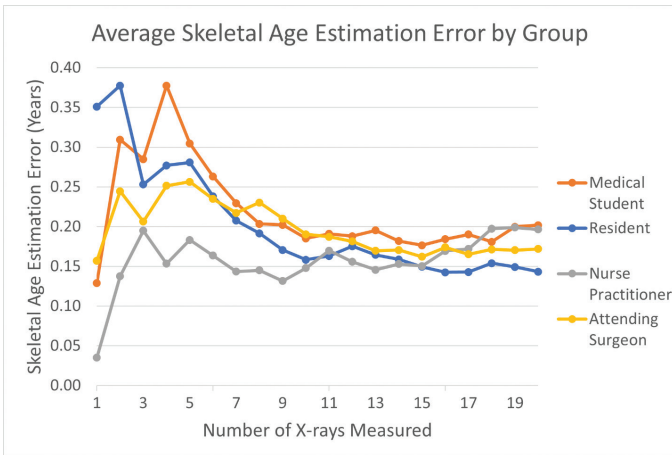


Figure 1. Regardless of group, skeletal age estimation reliability began to improve by the fourth x-ray measured, reaching steady proficiency by the 10th x-ray measured.

Skeletal Maturity?” mobile application, and proficiency in skeletal age estimation is obtained by the 10th radiograph.

Reprinted with Permission from AAP. The Young Investigator Awards (YIA) recognize the best abstract presentations by residents, fellows, and students at the annual scientific session during the National Conference & Exhibition.