A New Validated Shorthand Method for Determining Bone Age
Heyworth BE, Goldstein M, Schneider R, Gholve PA, Widmann RF, Green DW, Burke SW, Scher DM
Hospital for Special Surgery, New York, NY

Purpose
To investigate a novel method of radiographic assessment of bone age to serve as a simpler and more efficient alternative to the current standard methods, including use of the Radiographic Atlas of Skeletal Development of the Hand and Wrist published by Greulich and Pyle in 1950.

Methods
A shorthand bone age method developed at our institution for male patients was compared against the Gruelich and Pyle method from which it was derived. Sixty-three standard left hand bone age radiographs of male patients, previously assigned skeletal ages ranging from 12.5 years to 16 years by radiologists using the Gruelich and Pyle radiographic atlas, were read, using the shorthand method, by three pediatric orthopaedic attendings, a musculoskeletal radiologist, a pediatric orthopaedic fellow, and an orthopaedic resident. The shorthand method utilizes a single written criteria for each age, rather than a radiographic image and multiple criteria. Inter-observer reliability and agreement with the previous readings made using the atlas were calculated using weighted kappa values.

Results
The shorthand bone age method demonstrated high agreement with readings by the Gruelich and Pyle atlas, demonstrating weighted kappa values ranging from 0.73-0.79, and high inter-observer reliability, with values ranging from 0.66-0.87.

Discussion
These results for male patients are comparable or superior to previous reports investigating validity and reliability of other bone age assessment tools, such as the Gruelich and Pyle system. Moreover, the assessment was performed in a time efficient manner without necessitating reference to the Greulich and Pyle atlas, utilizing criteria that are easily and rapidly committed to memory. Further research assessing female age groups is warranted.

This validated shorthand bone age assessment tool offers a reliable, simpler and more efficient alternative to current methods, for use by residents, fellows, radiologists, and pediatric orthopaedic surgeons.

For access to this poster and a printable version of a handout with the shorthand method available to surgeons and radiologists for clinical use, please refer to www.hss.edu/boneage
Correspondence: scherd@hss.edu