BASIC: Bone Age Study In Children

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Background

Bone age studies require X-ray of the left hand and wrist to assess skeletal maturity. The Tanner-Whitehouse 3 (TW3) scoring method provides an objective framework for calculating bone age and specifies exact placement of the hand.[1]

In our service we have noted a number of poor quality films caused by difficulty with hand placement, e.g. scrunching of the fingers. This compromises the ability to score the X-rays accurately and can necessitate re-X-ray. This has financial consequences and can result in increased radiation exposure.

Method

We performed a prospective study of all bone age X-rays conducted at Sheffield Children's Hospital from May 2013 to February 2014.

The quality of bone age X-rays was rated by a single specialist Auxology Nurse. The position of the thumb, fingers and the overall clarity of the X-ray were scored on a simple 1-3 scale (1 = poor, 2 = adequate, 3 = good), generating a score out of 9.

The need for re-X-ray was noted. The criteria determining the need for re-X-ray included:

1. Any bone age X-ray whose score for either finger positioning or clarity was equal to 1 (poor quality).
2. Any X-ray where the thumb positioning scores 2 (adequate quality) where any of the other category scores <3.

Results

- Of the 259 bone ages studied, from patients aged 1.92 to 18.48 years, 123 were females.
- The number of studies scoring less than 3 for position of fingers, thumb and overall clarity was 38 (14.67%), 26 (10.04%) and 77 (29.73%) respectively (*see fig. 1*).

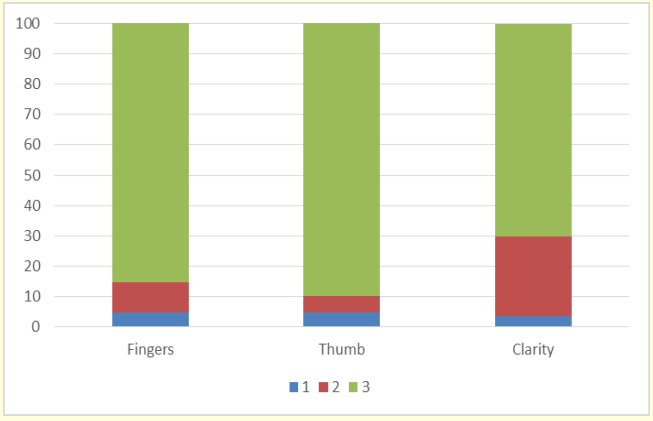

Fig 1. The percentage of scores (1-3) for each scored parameter.

- There were 12 X-rays judged as poor quality (4.63%) (a score of 1) for both the finger and thumb positions and 9 for X-ray clarity (3.47%).
- The number of re-X-rays required was 28 (10.81%) (*see fig. 2*).

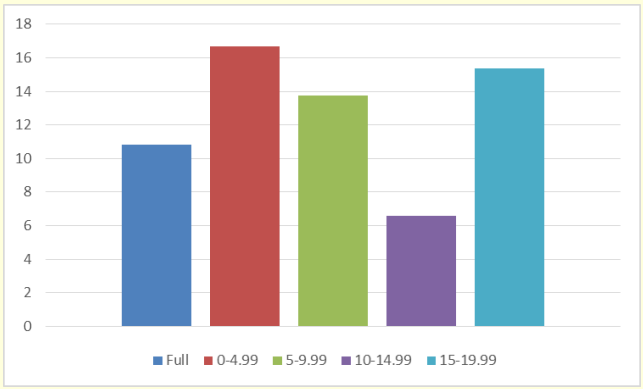

Fig 2. The percentage of studies requiring re-X-ray for each age category.

Discussion

- We believe a re-X-ray rate of 10.81% is unnecessarily high.
- Achieving good quality films on which to assess bone age may be more difficult than presumed.
- We have devised a simple, radiolucent, hand outline template which is placed on the X-ray plate to encourage the correct positioning of the hand. We are currently evaluating its efficacy using the same scoring system demonstrated in this prospective study.

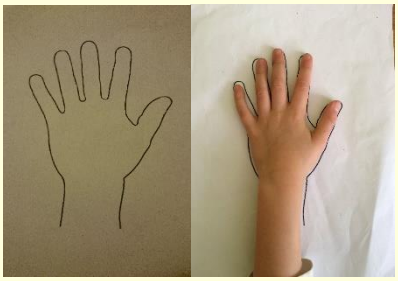

Fig 3. BASIC hand print. Shown with and without user

References

1. Tanner J M, Healy M, Goldstein H. *et al.* Assessment of skeletal maturity and prediction of adult height (TW3 Method), 3rd edn. London: WB Saunders, Harcourt Publishers Ltd 2001