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).

- 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).

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.

References