

# 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.<sup>1</sup>

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.

We introduced a simple radiolucent hand template (Fig.1) to assist positioning of the patient's hand and assessed changes in X-ray quality and need for re-X-ray.

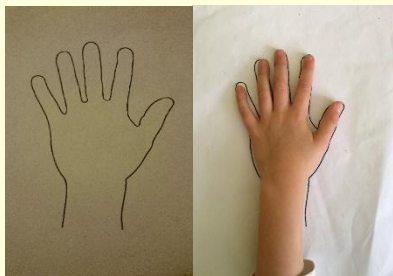


Fig 1. BASIC hand print. Shown with and without user

## Method

The position of fingers, thumb and overall clarity of bone age X-rays were prospectively scored by a single Auxology Nurse blinded to whether or not the template was used. In the absence of a validated tool to assess quality a 1-3 scale (poor, adequate, good) was devised.

A simple radiolucent hand template was introduced in the intervention group.

The need for re-X-ray was determined by set criteria which included:

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

## Results

- There were no significant differences between the control (N=259) or intervention groups (N=56) in terms of gender. The intervention group were slightly younger ( $p=0.03$ ). Patients age ranged between 0.9-18.48 years (mean=9.99 +/-3.84).
- **The intervention improved X-ray quality scores.** Fewer patients scored less than 3 for the position of fingers (14.67% and 10.71%,  $p=0.38$ ), thumb (10.04% and 1.79%,  $p=0.06$ ) and overall clarity (29.73% and 23.21%,  $p=0.41$ ) for the intervention and control groups respectively. (Fig .2)

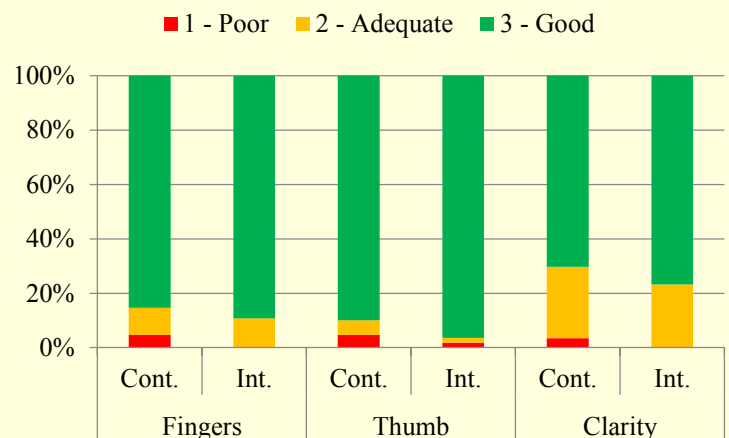


Fig 2. Comparison of the percentages of scores between the control (Cont.) and intervention (Int.).

- **The template significantly reduced the numbers requiring repeat X-ray.** No patient required a re-X-ray from the intervention group, compared to 28 in the control group ( $p=0.007$ ).

## Discussion

- Achieving good quality films on which to assess bone age may be more difficult than presumed.
- The use of a simple radiolucent hand template has been shown to improve the positioning of the hand.
- This significantly improves X-ray quality and reduces the need for re-X-ray.

## 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