

# Lateral radiographs: do they improve fracture detection in physical abuse

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No conflicts of interest to declare

# SCoR and RCR Guidance 2017<sup>2</sup>

UK + Europe<sup>3</sup>

New inclusion of lateral radiographs  
of the joints

- Time consuming
- Distressing
- Added radiation
- Necessary?

**The radiological investigation of  
suspected physical abuse in children**  
*Revised first edition*



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- Paucity of evidence<sup>4</sup>

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New inclusion of lateral radiographs  
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- Time consuming
- Distressing
- Added radiation
- Necessary?
- Paucity of evidence<sup>4</sup>
- Variation in international practice<sup>5,6</sup>

## **The radiological investigation of suspected physical abuse in children** *Revised first edition*



*What is the added value of lateral limb radiographs in SPA?*

***-diagnostic yield (fracture detection)***

***-reporter confidence***



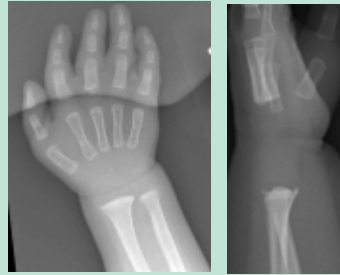
# Method



Single centre  
Retrospective (Oct 2017 – Nov 2020)  
All complete skeletal surveys performed for suspected physical abuse or post-mortem



Two blinded radiologists:  
  
Frontal radiographs



Two blinded radiologist:  
  
Frontal + **lateral radiographs**



Fracture present?  
  
Confidence  
Scale 1-5

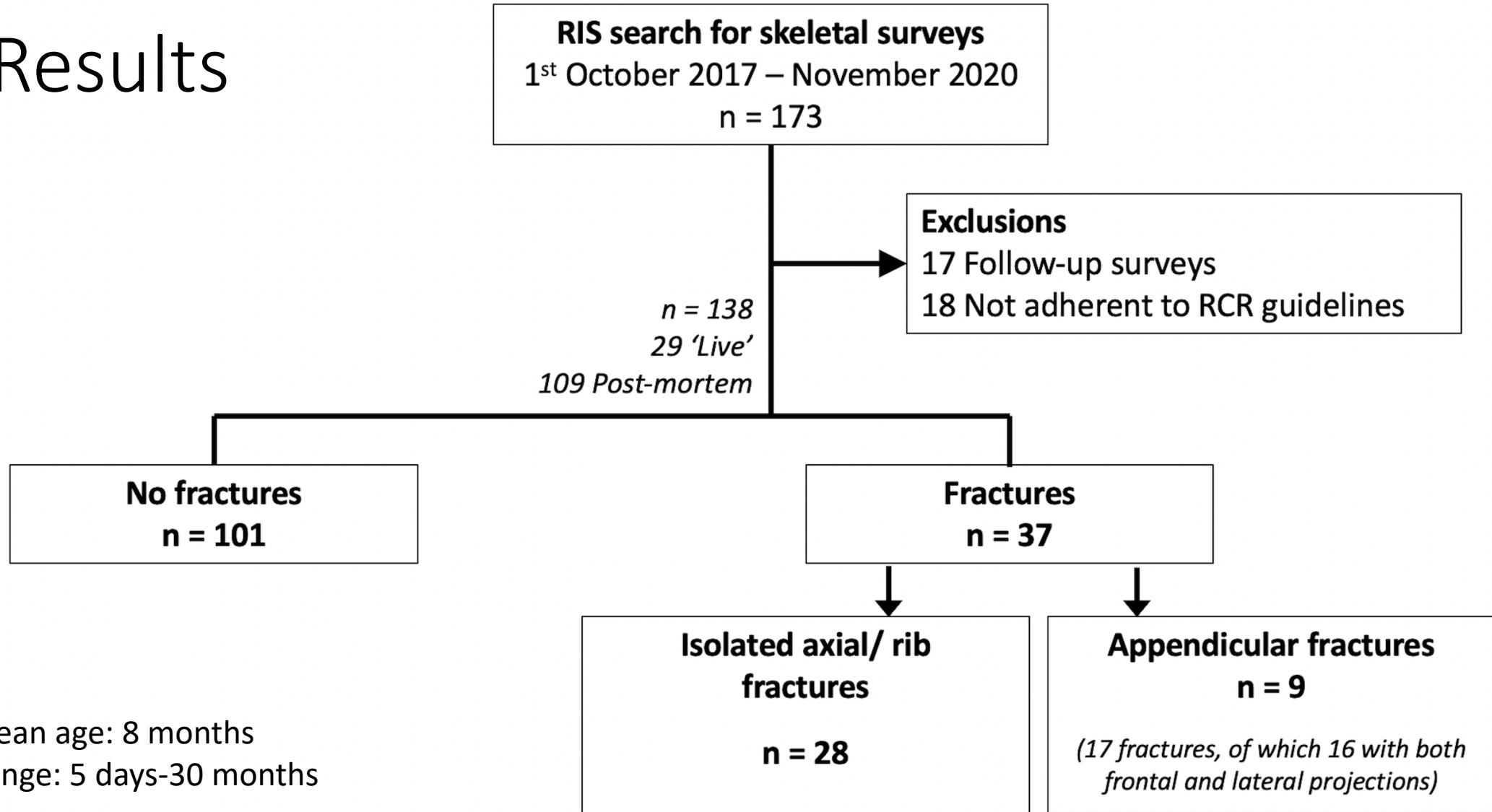


Compared to original report  
  
%fracture detected on frontal verses frontal + lateral  
  
Confidence

## Exclusions:

Non-SPA, children >30 months, follow up surveys, incomplete adherence to RCR guidance

# Results



Mean age: 8 months  
Range: 5 days-30 months

# Blinded Review: Fracture Detection

- Rad1 detected 15/16 (94%) fractures; Rad2 detected 14/16 (88%) fractures
- No overcalls



# Blinded Review: Fracture Detection

- Rad1 detected 15/16 (94%) fractures; Rad2 detected 14/16 (88%) fractures
- No overcalls
- 2/16 fractures not detected by frontal view alone

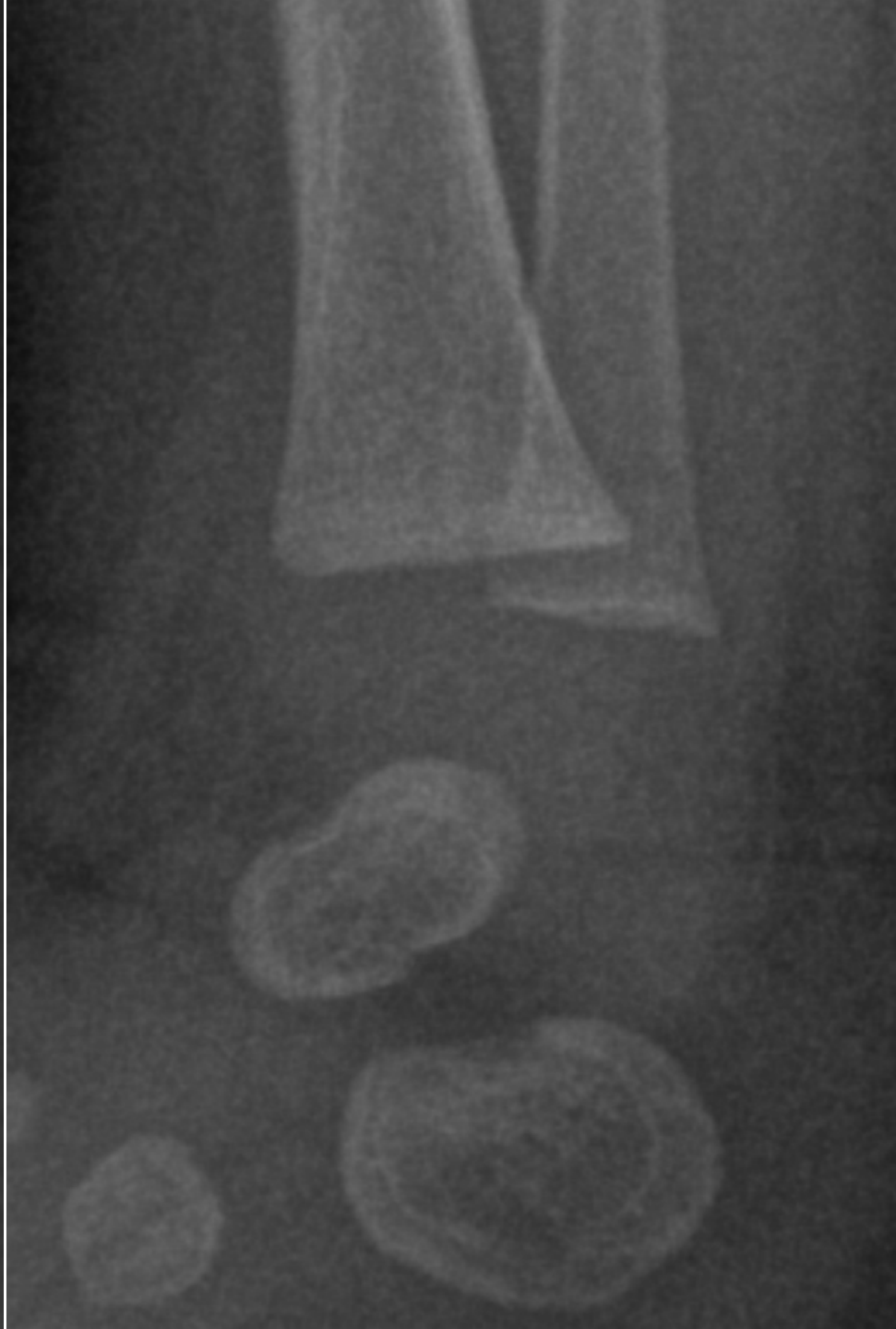


3-month-old female. AP and lateral radiographs of the right ankle demonstrating a right distal tibia fracture (arrow)

Radiologist 1: called normal



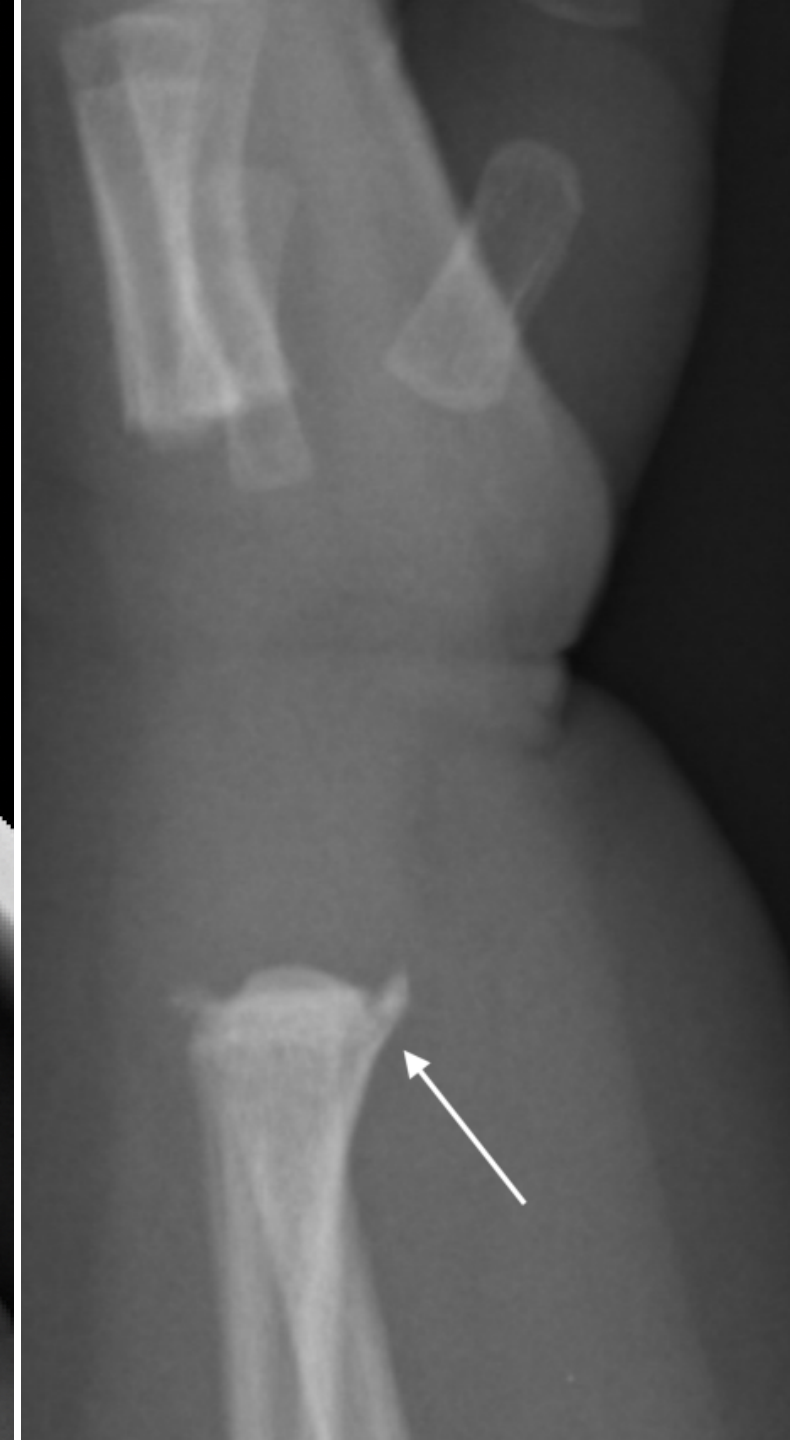
Radiologist 2: called fracture with the addition of the lateral view only.



Follow up  
11 days later

Was this a fracture?

20% heal without  
callus<sup>7</sup>





DP left hand of the same  
child

**The distal wrist was not  
included in 42/138 (30%) of  
cases**



# Confidence Scores

	Radiologist 1			Radiologist 2		
	Single view	Two views	P value	Single view	Two views	P value
<b>Mean confidence score overall</b>	4.97 (3-5)	4.99 (2-5)	<b>0.0027*</b>	4.89 (3-5)	4.95 (3-5)	<b>0.0005*</b>
<b>Fracture</b>	4.68 (3-5)	4.81 (3-5)	0.4962	4.22 (3-5)	4.42 (3-5)	0.1370
<b>No Fracture</b>	4.98 (3-5)	4.99 (2-5)	<b>0.0030*</b>	4.92 (3-5)	4.96 (3-5)	<b>0.0010*</b>

Confidence significantly improved by lateral view in normal cases

Confidence not significantly improved by lateral view in fracture cases (low numbers)

# Limitations

- Single Centre: potential selection bias
- Large number of surveys, small number of appendicular fractures

# Conclusion

Majority of metaphyseal corner fractures can be seen on AP view alone

The value of the lateral view is when the frontal view is normal:

1. To improve confidence in diagnosing normality
2. Detect subtle fractures not seen on AP (2/16 cases)

**We should continue as per RCR Guidance to carry out lateral views**



# References

1. Office for National Statistics. Child Abuse in England and Wales: March 2020. <https://www.ons.gov.uk/peoplepopulationandcommunity/crimeandjustice/bulletins/childabuseinenglandandwales/march2020> (accessed 23rd April 2021).
2. Royal College of Radiologists and The Society and College of Radiographers. The Radiological Investigation of Suspected Physical Abuse in Children. 2017. [https://www.rcr.ac.uk/system/files/publication/field\\_publication\\_files/bfcr174\\_suspected\\_physical\\_abuse.pdf](https://www.rcr.ac.uk/system/files/publication/field_publication_files/bfcr174_suspected_physical_abuse.pdf) (accessed 12th April 2018).
3. Offiah AC, Adamsbaum C, van Rijn RR. ESPR adopts British guidelines for imaging in suspected non-accidental injury as the European standard. *Pediatr Radiol* 2014; **44**(11): 1338.
4. Karmazyn B, Duhn RD, Jennings SG, et al. Long bone fracture detection in suspected child abuse: contribution of lateral views. *Pediatr Radiol* 2012; **42**(4): 463-9.
5. Wootton-Gorges SL, Soares BP, Alazraki AL, et al. ACR Appropriateness Criteria(®) Suspected Physical Abuse-Child. *J Am Coll Radiol* 2017; **14**(5s): S338-s49.
6. Phillips KL, Bastin ST, Davies-Payne D, et al. Radiographic skeletal survey for non-accidental injury: systematic review and development of a national New Zealand protocol. *Journal of medical imaging and radiation oncology* 2015; **59**(1): 54-65.
7. Karmazyn B, Marine MB, Wanner MR, Sağlam D, Jennings SG, Hibbard RA. Establishing signs for acute and healing phases of distal tibial classic metaphyseal lesions. *Pediatr Radiol* 2020; **50**(5): 715-25.
8. Patel H, Swinson S, Johnson K. Improving national standards of child protection skeletal surveys: the value of College guidance. *Clin Radiol* 2017; **72**(3): 202-6.
9. Swinson S, Tapp M, Brindley R, Chapman S, Offiah A, Johnson K. An audit of skeletal surveys for suspected non-accidental injury following publication of the British Society of Paediatric Radiology guidelines. *Clin Radiol* 2008; **63**(6): 651-6.

# Thank you for listening

Comments or questions?



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