

Introduction

- Few major children’s hospitals still utilize radiology residents to provide preliminary interpretations at children’s hospital, but this is becoming less common as imaging volumes increase and children’s hospitals request final interpretations at increasing rates (1).
- Most published studies view resident accuracy from a global lens without regard to pediatric radiology specifically (2).
 - Previously published significant discrepancy rates for residents have ranged from 0.33% to 1.9% (2).
 - Differences in discrepancy rates were insignificant between the postgraduate years (PGY-3: 1.8%, PGY-4: 1.7%, PGY-5: 1.5%) and between imaging modalities (3)
 - Rate of significant errors by on-call residents in regards to preliminary interpretations of head CT scans was low (4,8-9). Two studies demonstrated a significant discrepancy rate of 2% and 2.5% and another study demonstrated major discrepancy rate of 1.7% (4, 5-6).
- Interpreting neuroimaging studies is common for radiology residents at large pediatric medical centers, but it is challenging; imaging parameters such as field of view, slice thickness, and radiation dosage may differ in children.
 - One study demonstrated a major discrepancy rate of 0.17% on pediatric neuroimaging studies and found that most discrepancies occurred on CT examinations (6).
- Children’s hospitals may benefit from data regarding resident preliminary report accuracy of pediatric radiology procedures.

Methodology

- 21,560 preliminary reports issued by 39 residents over a 1-year period were scored as agreement, minor discrepancy, or major discrepancy by faculty members using the modified RADPEER scoring system agreement (8).
 - agreement (rating of 1 or 2), minor discrepancy (judged by the attending physician not to alter clinical management, scored as 2T), and major discrepancy (management-altering, scored as 3 or 4).
- Residents programs were 1 of 3: large university-based, medium-sized community-based, or small-sized community-based.
- Discrepancy rates were evaluated based on resident postgraduate year, imaging modality, and residency program. The effect of being a general pediatric radiology versus pediatric neuroradiology report of a CT was also tested. CT was the only modality in which there were comparable numbers of studies scored by both general pediatric radiologists and neuroradiologists.

Results

Table 1. Resident Preliminary Report Scores and Discrepancy Rates in Percentage by Year of Training.

PGY Year	Score	Total	Percentage
2	1&2	14086	94.09%
	2T	722	4.82%
	3&4	162	1.08%
3	1&2	5708	95.72%
	2T	210	3.52%
	3&4	45	0.75%
4	1&2	586	93.46%
	2T	31	4.94%
	3&4	10	1.59%

*The difference in major discrepancy rates is statistically significant between PGY-2 and PGY-3 residents (P=0.03), and additionally, between PGY-3 and PGY-4 residents (P=0.03), but not between PGY-2 and PGY-4 residents (P=0.23). PGY = Postgraduate year.

Table 3. Resident Preliminary Report Scores and Discrepancy Rates in Percentage by Type of Program.

Program	Score	Total	Percentage
University	1&2	12428	93.88%
	2T	670	5.06%
	3&4	140	1.06%
Community 1	1&2	6877	95.78%
	2T	242	3.37%
	3&4	61	0.85%
Community 2	1&2	1075	94.13%
	2T	51	4.47%
	3&4	16	1.40%

*The difference between major discrepancy rates by residency program (university-based versus community-based versus another community-based program) was insignificant (P>0.07).

*Definition of scoring scale: agreement (rating of 1 or 2), minor discrepancy (rating of 2T), and major discrepancy (rating of 3 or 4).

Table 2. Resident Preliminary Report Scores and Discrepancy Rate in Percentage by Modality.

Modality	Score	Total	Percentage
Radiography	1&2	12900	95.39%
	2T	500	3.70%
	3&4	123	0.91%
US	1&2	4602	94.73%
	2T	229	4.71%
	3&4	27	0.56%
CT	1&2	2797	90.78%
	2T	228	7.40%
	3&4	56	1.82%
MR	1&2	81	82.65%
	2T	6	6.12%
	3&4	11	11.22%

*The difference in major discrepancy rates between modalities are all statistically significant (P<0.02).

Table 4. Resident Preliminary Report Scores and Discrepancy Rates in Percentage by Type of Report, General Pediatric Radiology CT vs. Pediatric Neuroradiology CT.

Type	Score	Total	Percentage
General	1&2	977	90.21%
	2T	85	7.85%
	3&4	21	1.94%
Neuro	1&2	1820	91.09%
	2T	143	7.16%
	3&4	35	1.75%

*The difference between major discrepancy rates by general pediatric radiology CT and pediatric neuroradiology CT was insignificant (P=0.71).

Summary

- Major discrepancy rates by year of training showed no correlation in progression of training
- All modalities demonstrated significant differences between one another in terms of major discrepancy rates with discrepancy rates highest for MR.
- There was no difference between CT’s interpreted for general pediatric radiology compared to CT’s interpreted for pediatric neuroradiology,
- There was no difference demonstrated between the 3 types of residency programs

Conclusion

- Radiology discrepancy rates for residents issuing preliminary reports at a large children’s hospital are similar to those reported for adult radiology procedures.
- Children’s hospitals may be justified in maintaining an independent radiology resident presence overnight rather than requiring attending radiologist coverage.

References

- Donaldson JS, Thakrar KH. 24/7 pediatric radiology attending coverage: times are changing. *Pediatr Radiol* 2017;47:803–807.
- Bruno MA, Duncan JR, Bierhals AJ, et al. Overnight resident versus 24-hour attending radiologist coverage in academic medical centers. *Radiology* 2018;289:809–813.
- Weinberg BD, Richter MD, Champine JG, et al. Radiology resident preliminary reporting in an independent call environment: multiyear assessment of volume, timeliness, and accuracy. *J Am Coll Radiol* 2015;12:95–100.
- Wysoki MG, Nassar CJ, Koenigsberg RA, et al. Head trauma: CT scan interpretation by radiology residents versus staff radiologists. *Radiology* 1998;208:125–128.
- Miyakoshi A, Nguyen QT, Cohen WA, et al. Accuracy of preliminary interpretation of neurologic CT examinations by on-call radiology residents and assessment of patient outcomes at a level I trauma center. *J Am Coll Radiol* 2009;6:864–870.
- Erly WK, Berger WG, Krupinski E, et al. Radiology resident evaluation of head CT scan orders in the emergency department. *AJNR Am J Neuroradiol* 2002;23:103–107.
- Guimaraes CVA, Leach JL, Jones BV. Trainee Misinterpretations on Pediatric Neuroimaging Studies: Classification, Imaging Analysis, and Outcome Assessment. *American Journal of Neuroradiology* 2011;32:1591–1599.
- Jackson VP, Cushing T, Abujudeh HH, et al. RADPEER scoring white paper. *J Am Coll Radiol* 2009;6:21–25.

