



Diagnostic Errors in Neuroradiology, Physician Experience Level and Tumor Board Participation at a Single Tertiary Academic Center

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Introduction

- Error rates for diagnostic radiology range between 1.7-9%.
1,2,11,3-10
- When there is high prevalence of abnormalities on the radiology studies, error rates range from 12.4-50%.¹²⁻¹⁹
- **Purpose:** explore the correlations of tumor board (TB) attendance and years of post-fellowship practice (CPY) with error rates at a single tertiary academic medical center (UC Davis).

Methods

- Retrospective study with Institutional Review Board approval.
- Searched internal Neuroradiology Quality Assurance (QA) database for errors made by attending neuroradiologists (n=11) at UC Davis from 2014 – 2020.
- All misses confirmed by two neuroradiologists and assigned a RadPeer score.
- Calculated post-fellowship years of clinical practice (CPY) and frequency of TB attendance for each radiologist.
- Specific tumor boards included: Head and Neck (H&N), Skull Base (SKB), Brain, and Pediatric Neuroradiology (PN).

Methods

- Classified errors as H&N, SKB, Brain, or PN misses.
- Correlated CPY and specific TB attendance rates with H&N, SKB, Brain, and PN misses using Spearman's rank correlation coefficients.
- A scatter plot matrix was generated using the rank values of these variables.

Results

Table 1. Summary Statistics of the Metrics of the Clinical Experience of Attending Neuroradiologists and Error Rate Measures

Variable	Mean	Std Dev	Median	Quartile Range	Range	Minimum	Maximum
Brain TB	12.27	11.43	15.00	18.00	35.00	0.00	35.00
Brain errors	1.28	0.73	1.27	1.15	2.42	0.59	3.02
CPY	13.30	15.91	6.10	25.40	43.70	0.30	44.00
H&N TB attendance	20.82	23.58	13.00	35.00	68.00	0.00	68.00
H&N errors	0.46	0.31	0.40	0.58	0.93	0.00	0.93
PN TB attendance	9.18	16.23	5.00	15.00	55.00	0.00	55.00
PN errors	0.52	0.37	0.50	0.47	1.37	0.00	1.37
SKB errors	0.43	0.57	0.24	0.41	1.92	0.00	1.92
Total errors	3.55	2.29	2.95	2.12	8.73	0.59	9.32
Volume Read Exams	16668.00	11892.97	16617.00	24207.00	32906.00	1078.00	33984.00
Total TB attendance	40.18	36.99	36.00	85.00	95.00	0.00	95.00

TB = Tumor Board; CPY= Post-fellowship years of clinical practice; H&N = Head and Neck; PN = Pediatric Neuroradiology; SKB = Skull Base; Volume Read Exams = total volume of read studies during the study period. Total, Brain, H&N, SKB, PN errors expressed as errors per 1,000 interpreted exams.

Results

Table 2. Spearman’s Rank Correlation Coefficients of Metrics of the Clinical Experience of Attending Neuroradiologists with Error Rate Measures (with p-values)

Variable	T Errors	H&N Errors	SKB Errors	Brain Errors	PN Errors
Total TB	-0.89	-0.81	-0.66	-0.82	-0.48
	(p=0.0002)	(p=0.002)	(p=0.03)	(p=0.002)	(p=0.13)
HN TB	-0.90	-0.79	-0.65	-0.79	-0.42
	(p=0.0002)	(p=0.004)	(p=0.03)	(p=0.004)	(p=0.19)
Brain TB	-0.81	-0.79	-0.54	-0.75	-0.48
	(p=0.002)	(p=0.004)	(p=0.08)	(p=0.008)	(p=0.13)
PN TB	-0.40	-0.46	-0.10	-0.36	-0.34
	(p=0.23)	(p=0.15)	(p=0.77)	(p=0.28)	(p=0.30)
CPY	0.05	0.08	0.28	-0.10	-0.16
	(p=0.88)	(p=0.82)	(p=0.41)	(p=0.77)	(p=0.63)

TB = Tumor Board; CPY= Post-fellowship years of clinical practice; H&N = Head and Neck; PN = Pediatric Neuroradiology; SKB = Skull Base; T = Total. Total, H&N, SKB, Brain, PN errors expressed as errors per 1,000 interpreted exams.

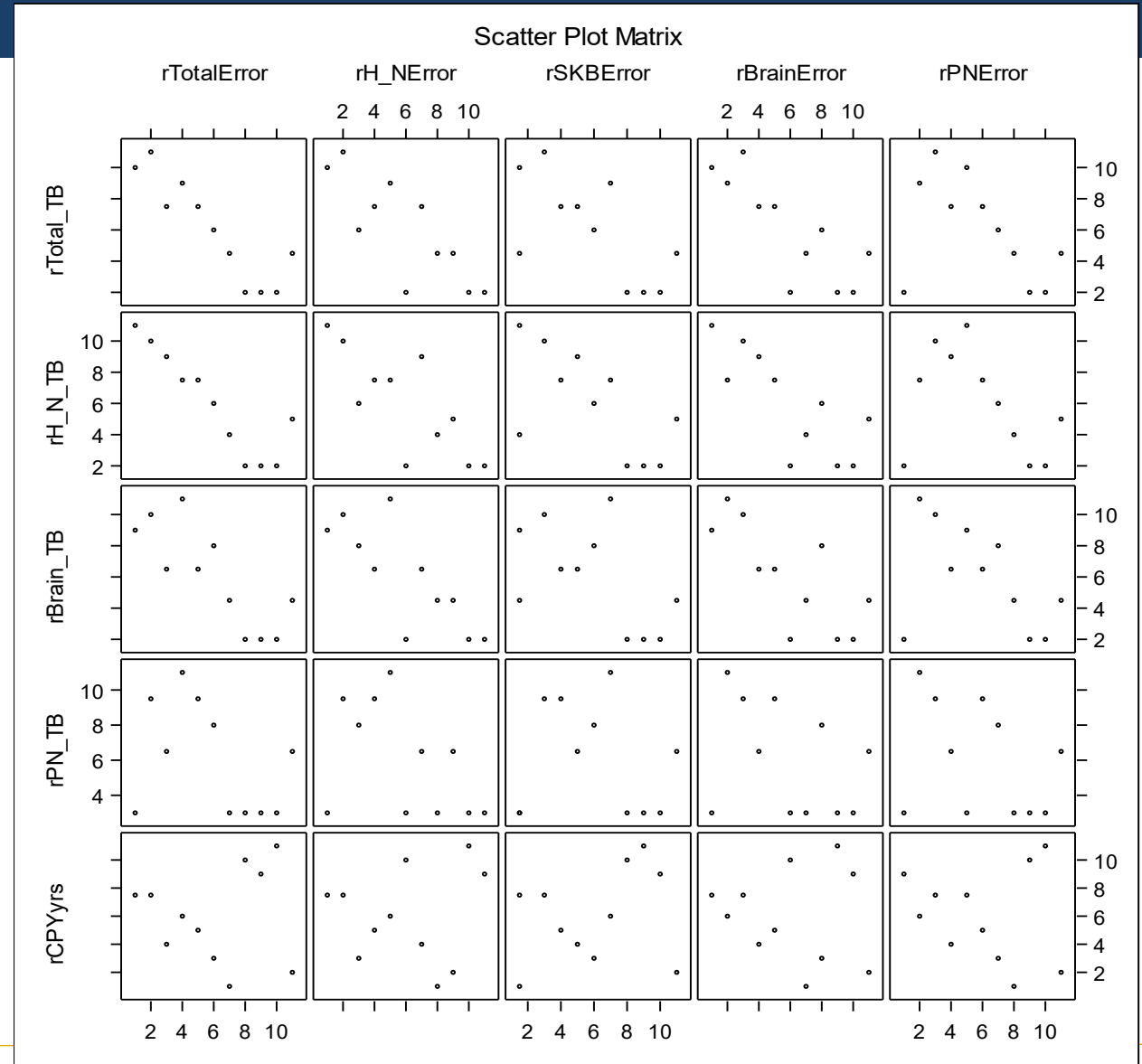
Statistically significant correlation coefficients bolded for clarity.

Results

Figure 1. The Scatter Plot Matrix of the Ranks of Metrics of the Clinical Experience of Attending Neuroradiologists and the Ranks of Error Rate Measures.

Footnotes:

rTotalError, rH_NError, rSKBError, rBrainError, rPNErrors, rTotal_TB, rH_N_TB, rBrain_TB, rPN_TB, rCPYyrs: rank of Total Error, HN Error, SKB Error, Brain Error, PN Error, Total TB, HN TB, Brain TB, PN TB and CPY, respectively. TB = Tumor Board; CPY= Post-fellowship years of clinical practice; H&N = Head and Neck; PN = Pediatric Neuroradiology; SKB = Skull Base. Total, Brain, H&N, SKB, PN errors expressed as errors per 1,000 interpreted exams.



Discussion/Conclusion

- Strong correlation between high overall Tumor Board participation and low yearly error rates.
- Strong correlation between high Head and Neck, Brain, and Skull Base Tumor Board participation rates and low error rates in those areas.
- Correlation between Pediatric Neuroradiology Tumor Board and Pediatric Neuroradiology error rates was not statistically significant.
- H&N TB is held once per week, Brain TB every other week, and PN TB once per month: so, lower power for Pediatric Neuroradiology TB.
- No correlation between CPY and error rates.
- **Recommend increased/continued tumor board participation throughout career.**

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