

# A Nationwide Analysis of Emergency Medicine Residents' CT Interpretation in Trauma: The Tract-EM study

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## **Introduction**

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Trauma is a leading cause of mortality and disability worldwide.

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Early and accurate CT interpretation is critical for patient outcomes.

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Emergency Medicine (EM) residents often perform preliminary CT readings.

# Objective

- Evaluate accuracy of trauma CT interpretation among EM residents
- Define factors predictive of failure in trauma CT interpretation on a national scale in turkey

# Methods and Study Protocol

- Nationwide, multicenter, cross-sectional study.
- Conducted in 29 academic emergency departments across Turkey from April 2023 to March 2024
- Participants: 401 senior EM residents interpreted 42 trauma CT series (cranial, maxillofacial, cervical) from 7 patients.
- Data collection: standardized cases, online assessment
- Residents interpreted scans under supervised conditions.
- Accuracy assessed using the Angoff method.

# Results Overview

A total of 57 grouped diagnoses, comprising normal and abnormal findings from 42 CT series of 7 patients, were interpreted by 401 senior residents. The male proportion was 61.8%, with a median age of 30. The median years of experience in emergency settings, encompassing general practice and residency, stood at 4 years. Notably, 62.3 % of participants reported acquiring Trauma CT interpretation skills through in-department training programs, 43.6 % via peer learning, and 30.7 % through online education-based platforms. The median duration of CT image interpretation was 57 min

the frequencies of CT interpretation in the ED, the length of interpretation time in the study, and the level of self confidence in detecting serious pathologies on CT scans before the radiology report were lower in the failed group compared to the passed group (Table 2). While the rates of in-department training programs and online education-based websites for the acquisition of interpretation skills were higher in the passed group, the rate of peer learning was higher in the failed group. Additionally, the frequencies of the final radiology report as an initial report type for CT scans and CT reports provided by the in-hospital radiology department were higher in the failed group compared to the passed group

**Table 2**  
Comparison of emergency medicine residents who passed and failed trauma CT interpretation.

Parameters	Total	Fail (n = 56)	Pass (n = 345)	P
Age, median (IQR)	30 (28-31)	29 (28-31)	30 (28-31)	0.680
Male gender, n (%)	248 (61.8)	36 (64.3)	212 (61.4)	0.685
Length of Interpretation Time in the Study, median minute (IQR)	57 (45-70)	50 (40-58)	59 (46-71)	< 0.001
Years of Experience in Emergency Settings, median (IQR)	4 (3-5)	4 (3-5)	4 (3-5)	0.224
Frequency of CT Interpretation in the ED, n (%)				0.044
● Never	2 (0.5)	0 (0)	2 (0.6)	
● Sometimes	14 (3.5)	5 (8.9)	9 (2.6)	
● Always	385 (96)	51 (91.1)	334 (96.8)	
Self-Confidence in Detecting Serious Pathologies on CT Scans Before Radiology Report, n (%)				0.002
● Confident	330 (82.3)	38 (67.9)	292 (84.6)	
● Unsure	62 (15.5)	15 (26.8)	47 (13.6)	
● Not-confident	9 (2.2)	3 (5.4)	6 (1.7)	
Acquisition of Skills to Interpret Trauma CT, n (%)				
● In-department training program	250 (62.3)	28 (50)	222 (64.3)	0.040
● Peer learning	175 (43.6)	31 (55.4)	144 (41.7)	0.057
● Online education-based websites	123 (30.7)	10 (17.9)	113 (32.8)	0.025
● Social media	83 (20.7)	10 (17.9)	73 (21.2)	0.572
● Books, articles, and other academic publications	67 (16.7)	8 (14.3)	59 (17.1)	0.600
● Out of department: courses, seminars	45 (11.2)	4 (7.1)	41 (11.9)	0.297
CT Reports Provided By, n (%)				0.030
● In-hospital radiology department	288 (71.8)	47 (83.9)	241 (69.9)	
● Private teleradiology company	113 (28.2)	9 (16.1)	104 (30.1)	
Initial Report Type Provided for CT Scans, n (%) <sup>*</sup>				0.025
● Preliminary report	199 (49.6)	20 (35.7)	179 (51.9)	
● Final report	202 (50.4)	36 (64.3)	166 (48.1)	
Frequency of Corrections in Initial CT Reports, n (%)				0.272
● A few reports per month	180 (44.9)	29 (51.8)	151 (43.8)	
● A few reports per week	161 (40.1)	20 (35.7)	141 (40.9)	
● A few reports every day	60 (15)	7 (12.5)	53 (15.4)	
Estimated Length of Pan CT Reporting Time by Radiologists, n (%)				0.744
● 0-2 h	189 (47.1)	26 (46.4)	163 (47.2)	
● 2-4 h	184 (45.9)	29 (51.8)	155 (44.9)	
● >4 h	28 (7)	1 (1.8)	27 (7.8)	
CT Scan Service Location				0.222
In the ED	344 (85.8)	51 (91.1)	293 (84.9)	
Outside the ED	57 (14.2)	5 (8.9)	52 (15.1)	

\* Preliminary reports are provided by radiology residents in the early hours and finalized by attending radiologists later. Final reports are directly provided by attending radiologists.

# Factors Influencing Interpretation

- Shorter interpretation time increased failure risk.
- Low self-confidence in detecting serious pathologies.
- Dependence on radiology reports.
- Lack of in-department training programs.

# Discussion

- Training gaps in trauma CT interpretation impact patient care, leading to potential misdiagnoses and treatment delays
- Faster interpretation may increase error rates.
- Lower confidence in detecting serious pathologies on CT scan before radiology report increases the interpretation failure
- The absence of participation in an in-department training program was specifically associated with failure in CT interpretation
- Active learning methods, such as care-based discussion and hands on workshops, improve interpretation skills
- Standardized radiology education programs, including formal training moduls, are necessary to improve accuracy



# Strengths of the Study

- Largest nationwide study on EM resident CT interpretation in Turkey.
- The study's extensive sample size and rigorous methodology, including the utilization of standardized CT scans and the Angoff method for scoring, contribute to the validity and reliability of its conclusions
- Identified key areas for training improvements.

# Limitations of the Study

- Simulation-like study design may not reflect real clinical settings.
- Limited number of trauma cases analyzed.
- Variability in participant engagement across centers.

# Conclusion

- EM residents demonstrated a 65% accuracy in trauma CT interpretation.
- Identified Key predictors of failure
- Findings highlight the need for improved training in trauma CT interpretation.
- Future research: expanding to torso and pelvic CT interpretations