

Integrating an LLM-Based Tool into Emergency CT Workflow: Enhancing Trainee Vetting and Protocolling in the NHS

Dr. Matthew Kueh¹, Radiology Registrar, University Hospital Southampton, United Kingdom,
Dr. Kiran Keshvara², Radiology Registrar, University of Southampton, United Kingdom
Dr. Ebinesh Arulnathan³, Consultant Radiologist, Alder Hey Children's NHS Foundation Trust, United Kingdom
Dr Sivakumar Manickam³, Consultant Radiologist, Mid and South Essex NHS Foundation Trust, United Kingdom

1

Purpose



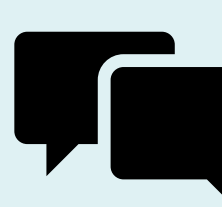
Radiology plays a critical role in acute decision-making within busy NHS emergency departments.



Efficient vetting and protocolling of CT requests are essential to ensure timely, appropriate imaging and to support safe, evidence-based patient care.



These are key competencies for radiology trainees as they progress toward independent practice, yet increasing service pressures can limit opportunities for structured feedback and supervised learning.



This study evaluates a customised large language model (LLM)-based chatbot as an assistive tool for residents vetting and protocolling emergency CT requests.

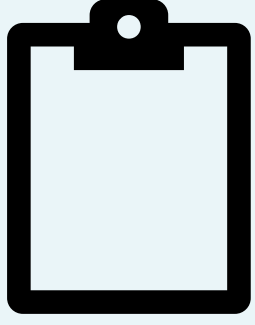


Aim: To assess whether AI assistance can improve workflow efficiency, decision making and educational value within an NHS tertiary centre.

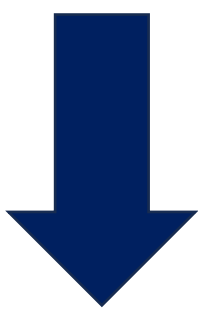
2

Methodology

- 783 on-call CT requests from the emergency department of a busy tertiary NHS hospital were retrospectively retrieved over a 1-month period.
- A custom GPT model was built on Chat GPT and supplied with up-to-date best-practice guidance, literature reviews, and meta-analyses relevant to emergency CT imaging.
- AI was prompted to take into account the clinical history, exam, labs as well as having an inbuilt safety questionnaire to account for allergies, renal function and pregnancy.
- For each request, clinical information was presented to 3 decision-makers:



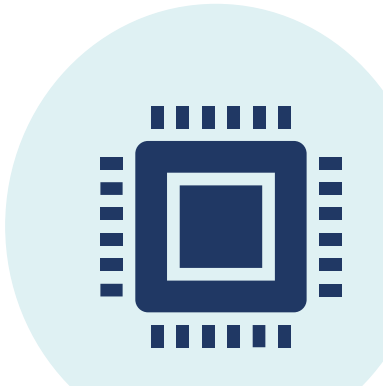
On-Call ED CT requests
retrospectively reviewed over 1 month



3 decision-makers



1
Radiology
Trainee



2
Customised
chatbot



3
Radiology trainee
with real-time
AI assistance



Comparison with
consultant reference standard
Established by an FRCR-
certified radiologist



Justification / vetting decision



Modality selection



Protocol choice



Prioritisation

3

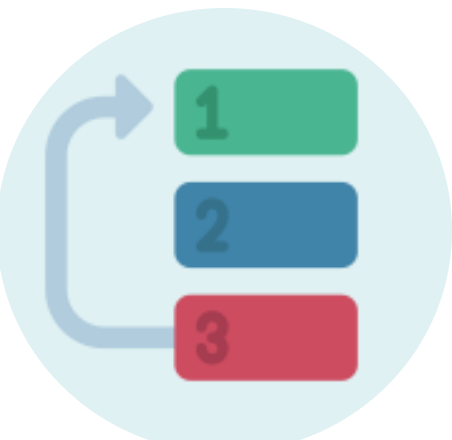
Results



Across adult trauma, medical, and surgical emergency indications, the trainee + AI group showed higher concordance with consultant reference decisions.



Trainee + AI group had mis-protocolled 6 requests. Whereas the trainee group had mis-protocolled 22 requests and the AI chatbot 15 requests.



The trainee incorrectly prioritised a total of 10 requests, mostly underestimating urgency. AI tends to overestimate urgency and has failed to prioritise 6 requests correctly.



When compared to the trainee alone, the trainee with AI assistance resulted in three fewer CT Heads and CT Abdomen/Pelvis'. This is estimated to be 30mSv of ionising radiation avoided which is equivalent to 10 years of background radiation prevented in a single month.



AI outputs may be overly cautious and heavily qualified, sometimes assigning disproportionate significance to isolated terms within a clinical vignette. This can lead to recommendations for imaging modality or urgency that are not fully appropriate for the overall clinical context.



Limitations of this study include its retrospective design, as most requests included in the sample had already undergone vetting and imaging at the time of analysis.

Future work should consider AI overcautiousness when developing prompts for custom GPTs used to support imaging request vetting.

4

Conclusion



- An LLM-based chatbot can function as a practical AI assist tool for residents vetting and protocolling emergency CT scans.
- The system reinforces key competencies in justification and optimisation.
- Guideline-informed, evidence-based reasoning at the point of request has the potential to improve patient safety, strengthen training, and enhance the efficiency and resilience of emergency imaging services across the NHS.

5

Key Takeaways



Supports trainee decision-making and offers educational value



AI recommendations were often cautious and heavily qualified, with a tendency to suggest multiple imaging phases.



May improve efficiency and patient safety



Precise prompting is critical for aligning custom GPT outputs with pragmatic NHS on-call radiology practice