

Brain Aneurysm Detection with AI Triage Assistance: A Retrospective Quality Improvement Study

Myers AC, Kemper NW, Negahdar MJ, Ding D, Meyer K, Friedrich A, Atlman A, Humphries J, Contractor S, Joshi JK

University of Louisville School of Medicine, Department of Radiology



Background

- Delays in brain aneurysm (BA) diagnosis and treatment due to large radiologist workloads can be fatal.
- Artificial intelligence (AI) enabled workflow triage tools can assist radiologists by flagging scans suspected of BA for more rapid diagnosis and attention.
- This study analyzes the improvement in detection of BA cases in a health system after implementing an AI triage tool.

Materials and Methods

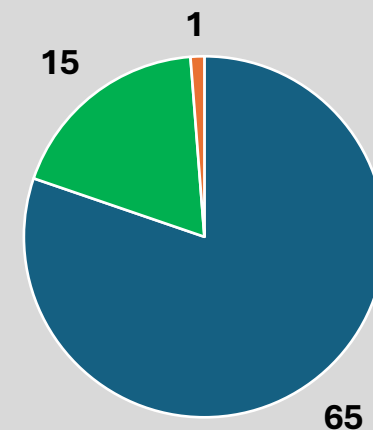
- A retrospective analysis was performed on **2422 head CT scans** from Feb. 16, 2024 to July 31, 2024.
- Cases were analyzed for brain aneurysm presence via an image-based AI triage workflow tool (*Aidoc, Tel Aviv, Israel*). Triage workflow for the tool is shown in **Figure 1**.
- Radiologist findings for BA were assessed by applying an NLP to the finalized reports.
- Radiologists identified **65 positive cases** in this time frame (2.68% prevalence).
- In cases of disagreement between the AI and radiologist findings, the images were sent to radiologists for ground truth adjudication.
- Enhanced detection rate (EDR) was calculated based on the percentage of cases with AI+ and radiologist negative findings. A ground-truth corrected miss rate was calculated following adjudication. Patients with newly discovered findings were contacted for clinical follow-up.

Results

- Results are summarized in **Table 1**. The AI module labeled 16 unique positive patients that radiologists had labeled negative, yielding a 24.6% enhanced detection rate.
- A single false positive case resulted in a miss rate of 23.1% (**Figure 2**).
- Of the 15 true positive new findings, 4 resulted in a recommendation of angiogram and surgical intervention. Over a year with similar case volume, the AI triage tool could assist with the detection of approximately **33 brain aneurysms than without** the tool.

Table 1. Results Summary

	Positive Cases	Prevalence	Annual Cases
Radiologists	65	2.68%	142
Radiologists + AI	80	3.30%	175
Difference	15	0.62%	33



■ Rads ■ Rads + AI ■ AI False Positive

Figure 2. BA Case Distribution

Conclusions

Image-based AI radiology workflow tools can improve the detection of time-sensitive pathologies, leading to improved patient outcomes.

Figure 1. AI-Assisted Triage Workflow.

