



# Comparison of Annalise.ai and RapidAI for Detection of Subarachnoid Haemorrhage on Head CT Scans



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## Background

Annalise.ai and RapidAI are commercial software programmes licensed to the Hospital Authority and can assist radiologists and clinicians in the imaging diagnosis of neurological emergencies such as intracranial haemorrhage (ICH). Annalise.ai is recently implemented in Prince of Wales hospital to aid Accident & Emergency Department (AED) physicians in the diagnosis of ICH.

Subarachnoid haemorrhage (SAH) is a subtype of ICH that can be challenging to diagnose clinically, and can be overlooked on head CT particularly if the SAH volume is small. This study aims to assess the performance of Annalise.ai and RapidAI in the detection of SAH in head CT scans, and to identify limitations in their application.

## Methods

- Plain head CT scans reported to have SAH from 1<sup>st</sup> June 2021 to 30<sup>th</sup> June 2022 were retrieved.
- CT scans with 0.6mm section thickness were processed with Annalise.ai and RapidAI modules.
- Results were compared with CT interpretation by AED physicians through retrospective retrieval of clinical records.
- Segmentation of ICH on false negative CT scans were performed to calculate the SAH volumes.

## Results

256 eligible head CT scans were retrieved and successfully processed. 25 cases were not detected by AED physicians.

Detection rates of Annalise.ai and RapidAI and volume of SAH in false negative results

AI Module	Overall detection rate of SAH	Detection rate for cases missed in AED	Volume of undetected SAH Average (Range)
Annalise.ai	96% (247/256)	84% (21/25)	0.35ml (0.05 – 1.77ml)
RapidAI	83% (213/256)	44% (11/25)	0.56ml (0.05 – 2.24ml)

Location of False Negative SAH	Annalise.ai	RapidAI
Cerebral sulcus	7	35
Ambient cistern	1	0
Sylvian fissure	0	1
Quadrigeminal cistern	0	2
Interpeduncular cistern	0	1
Interhemispheric fissure	0	1
Cerebellopontine angle cistern	1	1
Cerebral sulcus and basal cistern	0	2
<b>Total</b>	<b>9</b>	<b>43</b>

Number of false negative SAH cases based on location

## Conclusion

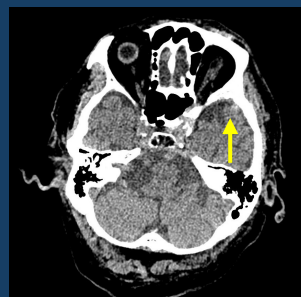
Annalise.ai showed superior detection rate of SAH compared to RapidAI (96% vs 83%). Both modules detected a significant proportion of SAH cases which were undetected by AED physicians. We identified the limitation of both modules in the detection of subtle SAH in the sulcal spaces or cisterns, which serve as important areas for cross-checking by frontline physicians.



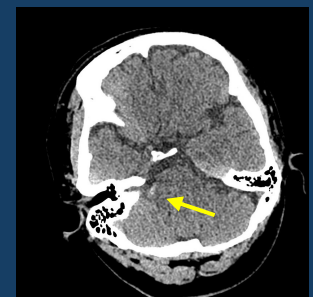
False negative on RapidAI only: SAH in right ambient cistern



False negative on Annalise.ai only: SAH in right calcarine sulcus (streak artefacts from bilateral cochlear implants)



False negative on both: SAH in left temporal sulci



False negative on both: SAH in right cerebellopontine cistern