

Audit of appropriate ED imaging workup for intracranial aneurysm in the setting of known or suspected subarachnoid hemorrhage

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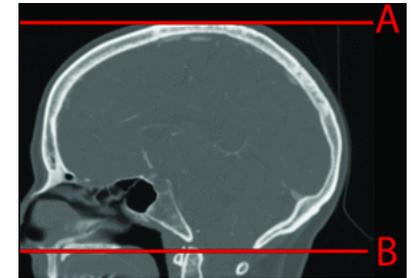
St. Paul's Hospital



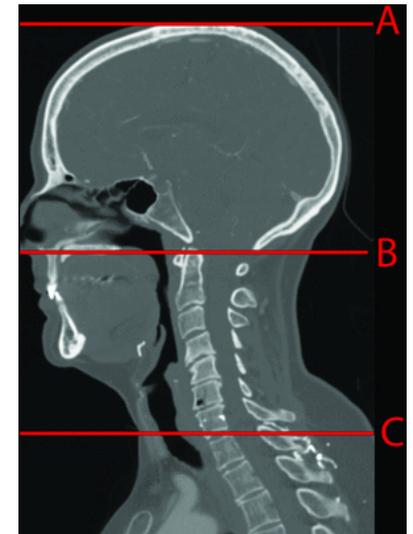
Acknowledgement: Dr. Krystaleah Lindsay(emergency physician) and Dr. Christine Henderson(emergency physician, CQI)

Background and Aim of the Audit

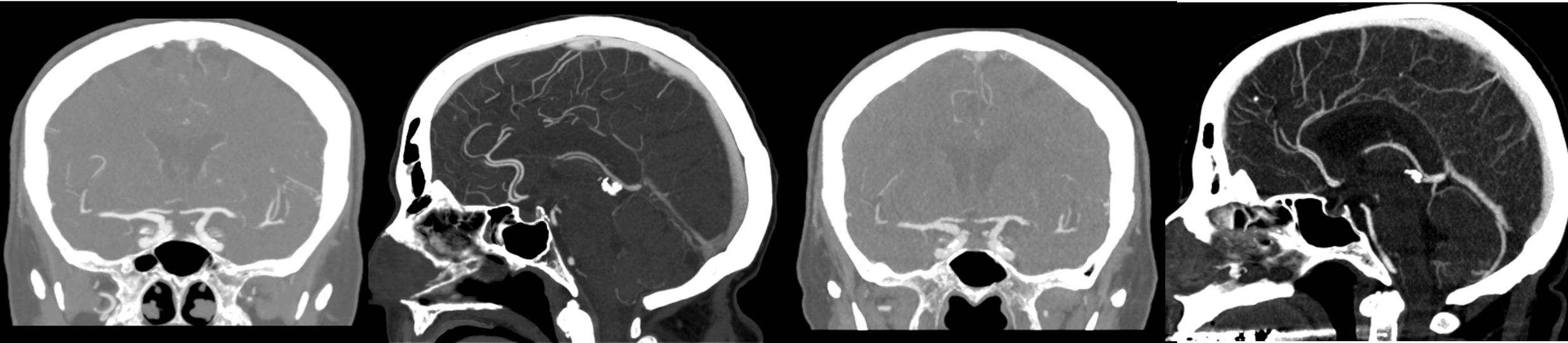
- Concern for appropriate imaging:
 - Many patients with CT diagnosed SAH or suspected imaging occult SAH were being worked up with a **CTA arch to vertex** when a **CTA head** is the **gold standard**
- CTA head benefits:
 - Less radiation exposure
 - **70% dose reduction** (1.6 mSV vs 5.4 mSV)
 - At the center involved in this audit, the CTA head study has significantly **better contrast attenuation** of the intracranial vasculature



CTA Head/
Circle of Willis/
Base to vertex



CTA Arch to Vertex



CTA head



CTA arch to vertex



These images belong to the same normal patient, one was a CTA Head study where his vessels appear smooth, while the other one is a CTA arch to vertex study, where his intracranial vessels look quite irregular.

Standard and Audit Target

Variant 6: Clinically suspected acute SAH, not yet confirmed.

Radiologic Procedure	Rating	Comm
CT head without IV contrast	9	
CT head without and with IV contrast	5	
MRI head without IV contrast	5	
MRI head without and with IV contrast	5	
CTA head with IV contrast	5	
MRA head without IV contrast	4	
MRA head without and with IV contrast	4	
CT head with IV contrast	3	
Arteriography cervicocerebral	2	
MRA neck without IV contrast	2	
MRA neck without and with IV contrast	2	
CTA neck with IV contrast	2	

Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate

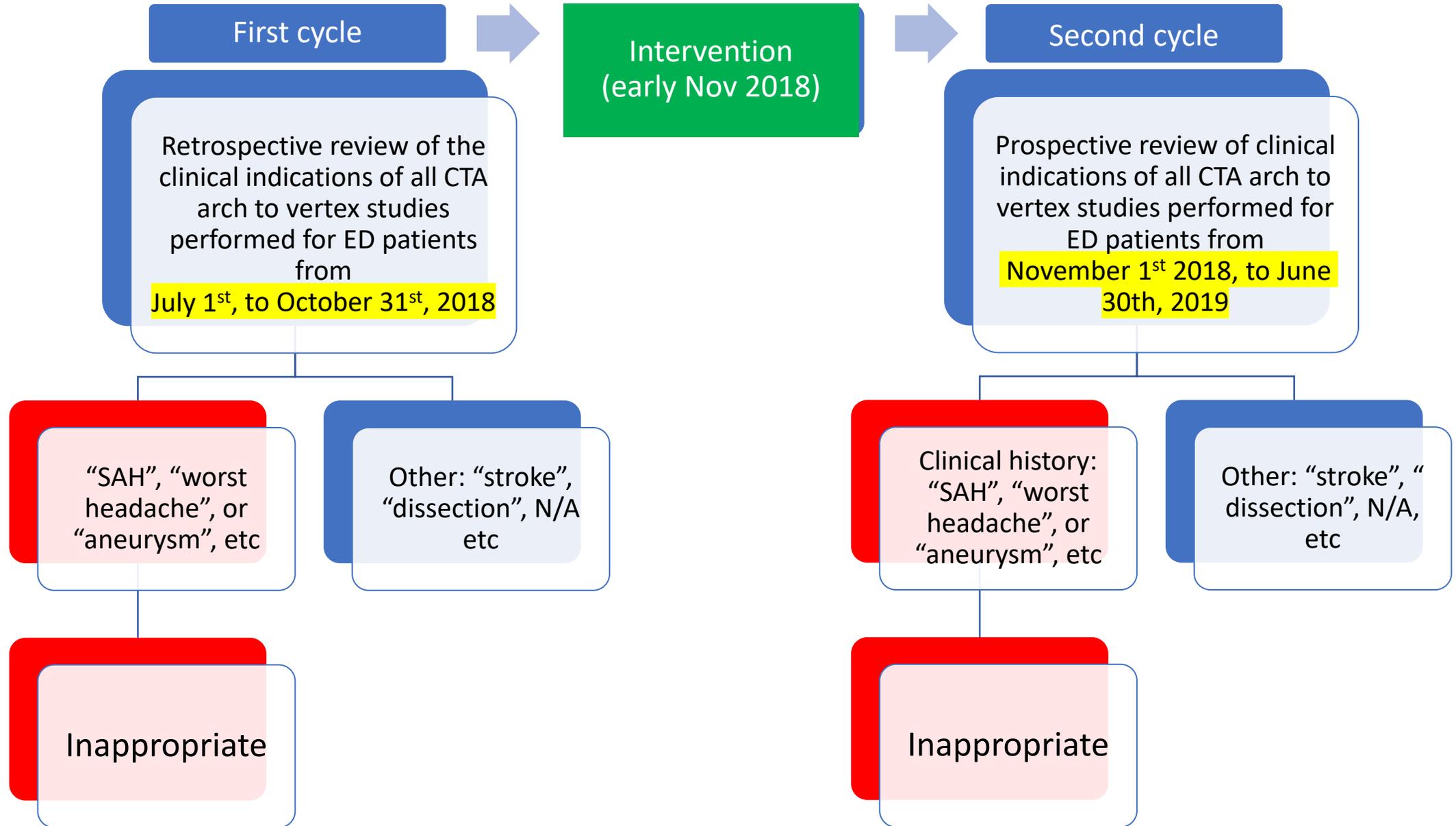
American College of Radiology ACR appropriateness criteria: for clinically suspected SAH:

- Non-contrast CT head: **usually appropriate**
- Non-contrast CT head and CTA head: **may be appropriate.**
- CTA neck with IV contrast(basically what CTA arch to vertex adds on top of a CTA head study): **usually not appropriate**

Audit Target:

- **100%** of the time, patients with CT diagnosed SAH or suspected imaging occult SAH and concern for intracranial aneurysms should obtain a CTA head rather than a CTA arch to vertex.

Methods



A total of 30 hours were involved in the audit.

First Cycle Results (Pre-intervention)

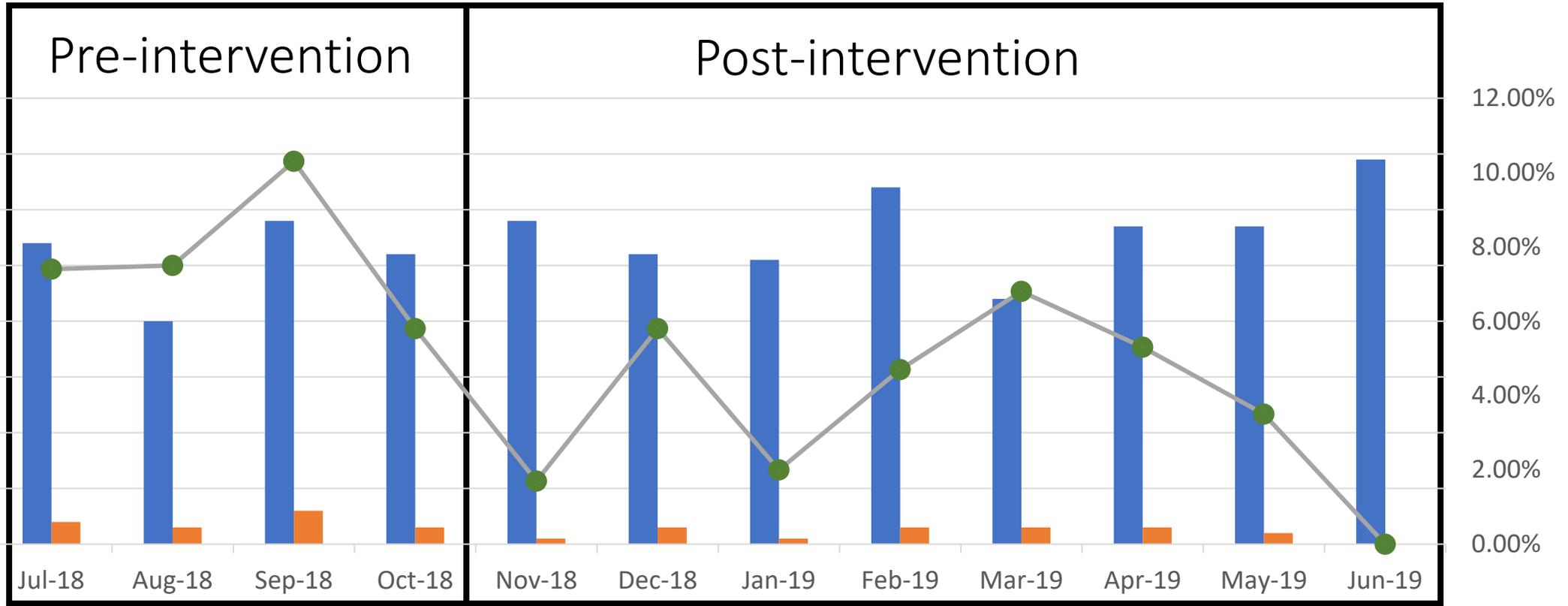
	Inappropriate CTA arch to vertex performed for ED patients for ? aneurysm	Total CTA arch to vertex studies performed for ED patients	% of inappropriate studies
July 2018	4	54	7.4%
August 2018	2	40	5.0%
September 2018	6	58	10.3%
October 2018	3	52	5.8%
Total: July to October 2018	15	204	7.4% (does not meet target)

Intervention

- Source of Error
 - **Requesting physician** may order CTA arch to vertex inappropriately
 - **Unit clerk** may input the incorrect CTA protocol
 - **Radiology staff/resident** may protocol it incorrectly
- Action
 - Collaboration with **ED's CQI**
 - **E-mails** sent to ED staff regarding appropriate imaging issue
 - **Reminder posters** placed at order entry stations
 - Communication with **Radiology Staff and Residents**
 - **Email reminder** to identify inappropriate requests and correct them diligently
 - Raise unit clerk awareness (**not performed in this audit**)

Second Cycle Results (Post-intervention)

	Total CTA arch to vertex studies performed for ED patients	Inappropriate CTA arch to vertex performed for ED patients for ? aneurysms	% of inappropriate studies
November 2018	58	1	1.7%
December 2018	52	3	5.8%
January 2019	51	1	2.0%
February 2019	64	3	4.7%
March 2019	44	3	6.8%
April 2019	57	3	5.3%
May 2019	57	2	3.5%
June 2019	69	0	0
Total: Nov 2018 – Jun 2019	452	16	(3.5% improved from 7.4%), does not meet target



- Inappropriate CTA arch to vertex performed for ED patients for ? aneurysms
- Total CTA arch to vertex studies performed for ED patients
- % of inappropriate studies

Discussion/ Conclusion

- After educating and reminding the ED physicians and radiology staff and residents, the incidence of inappropriate imaging was reduced by more than 50% (7.4 -> 3.5%) over the next 8 months.
- A collaborative effort between the emergency and radiology department is required for improvement of patient care.
- With time, the level of awareness drops, repeated reminders are needed
- Broaden our scope of intervention:
 - Technologists (increase awareness)
 - Reach out to other specialties
 - Inappropriate studies were also ordered by Neurology, Internal Medicine, Family Medicine, etc.