Implementation of Viz.AI Artificial Intelligence to Improve Stroke Workflow and Metrics at a Comprehensive Stroke Center

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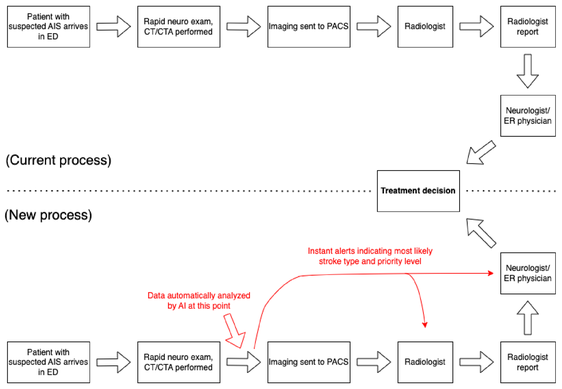
Background

- Acute ischemic stroke is a common and often devastating condition that we see every day in the emergency department, and it is a leading cause of death and long-term disability globally[1]
- Endovascular therapy (EVT) in the form of mechanical thrombectomy is the mainstay of treatment for acute large vessel occlusion (LVO) ischemic stroke, but its efficacy is highly time sensitive
- Delays in stroke care pathways are often a result of disorganized communication and inefficient communication between all members of the care team
- Taking steps to improve these processes is crucial to improving the quality of stroke care
- Viz.AI is a platform that uses artificial intelligence to automatically detect LVOs with computed tomography (CT) imaging
- The mobile application provides immediate access to the CT images as well as a platform for centralized communication
- We sought to determine if the implementation of Viz.AI at our comprehensive stroke center improved stroke workflow and metrics

Objective

- To Improve the quality of stroke care at Medical City Arlington with the implementation of Viz.AI, an application designed to improve reperfusion times by utilizing artificial intelligence to rapidly detect LVO strokes and providing a centralized platform for communication between all members of the stroke care team



Methods

- Retrospective review of all LVO stroke cases that underwent EVT from June 2020 through December 2022
- Viz.AI was implemented at our facility on July 1, 2021
- Transfers and inpatient stroke cases were excluded for this analysis
- Primary outcome: mean time of arrival in the emergency department to arrival at interventional radiology suite (EDIR)
    - Metric that best demonstrates the role of Viz.AI in improving reperfusion times
- Secondary outcome: Rates of end-of-procedure substantial reperfusion - modified thrombolysis in cerebral infarction (mTICI) scores of 2C/3
- Results were analyzed using a Mann-Whitney U test

Results

Thrombectomy Times

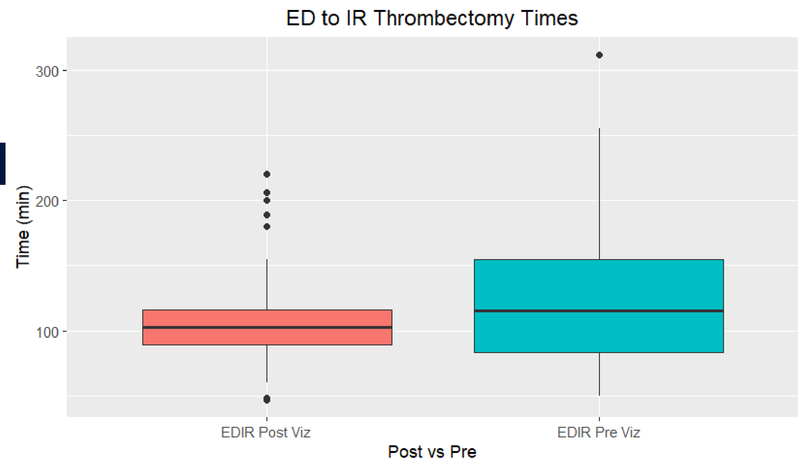
	Median Time (min)	Mean Time (min)
Pre-Viz.AI	115	125
Post-Viz.AI	103	109

mTICI scores (Pre-Viz.AI)

mTICI	1	2a	2b	2C	3
# of cases	0	1	5	7	19
% of cases	0%	2.86%	14.29%	20%	54.28%
Rate of substantial reperfusion (mTICI 2C/3)	74%				

mTICI scores (Post-Viz.AI)

mTICI	1	2a	2b	2C	3
# of cases	1	1	9	6	21
% of cases	2.63%	2.63%	23.68%	15.79%	55.26%
Rate of substantial reperfusion (mTICI 2C/3)	71%				



Discussion

- Median EDIR times decreased by 12 minutes with the implementation of Viz.AI, but this difference was not statistically significant (p = 0.174)
- This is likely because our sample size was relatively small. LVO strokes are a relatively uncommon type of ischemic stroke, and there were only 78 cases that underwent thrombectomy during the 31 month course of this study
- Lack of statistical significance does not equate to lack of clinical significance
- Even small improvements in reperfusion times often lead to dramatic improvements in functional outcomes with highly time-sensitive conditions such as acute ischemic stroke.
- As time went on during the post-Viz.AI phase, there was steady improvement in the efficiency of the process and in EDIR times. The median EDIR time during the last 5 months of the study period (last 14 cases) was 91 minutes compared to a mean of 110 minutes for the preceding cases in the post-Viz.AI group
- One of the main weaknesses of this study is that no long term follow up outcomes were measure, so it is difficult to quantify the actual clinical effect that this process improvement had on our patients

Conclusion

- Viz.AI software automatically detects potential LVOs and allows for rapid mobilization of the stroke team for patients who are potential candidates for EVT
- Our study found no statistically significant difference, and it is likely that a larger sample size will be needed to assess the true benefit of Viz.AI in our system.
- This could potentially be accomplished by involving other Medical City Healthcare stroke centers in the DFW area, or by collecting data for several more years.

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