Transthoracic echocardiography prioritization in hospitalized patients undergoing evaluation for acute ischemic stroke

Alan Yaacoub MD, Brittany Young MSN, Logan Eslinger MD, Margie Campbell BSN, Jessica Lee MD, Kevin O'Connor MD

University of Kentucky College of Medicine
Department of Neurology

BACKGROUND

Transthoracic echocardiography (TTE) is an important tool in the workup of acute ischemic stroke to identify sources of emboli, such as atrial fibrillation, aortic plaque, left atrial thrombi, or patent foramen ovale (PFO). Within our department, a concern regarding timeliness of discharge and patient care delay has been identified. One of the suspected contributors to this is a delay in obtaining TTEs in patients undergoing stroke workup. Additionally, there is concern regarding appropriateness of TTE orders among patients admitted for stroke workup, including orders for patients who have mechanisms determined to be non-embolic and inappropriate ordering of bubble studies. Our institution has implemented several measures to address this, including a guideline recommending TTE orders on patients admitted with cardioembolism or embolic stroke of undetermined source and reducing orders for other clear etiologies such as small vessel disease, thromboembolism, or atheroembolism without other cardiac pathology. Additionally, a process to improve communication between the stroke team and TTE sonographers was implemented to identify patients who would benefit from earlier TTE prioritization to prevent delays in treatment and disposition.

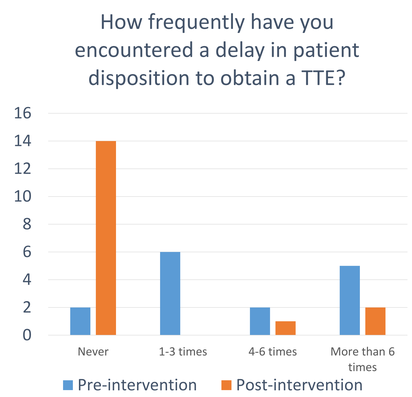
OBJECTIVES

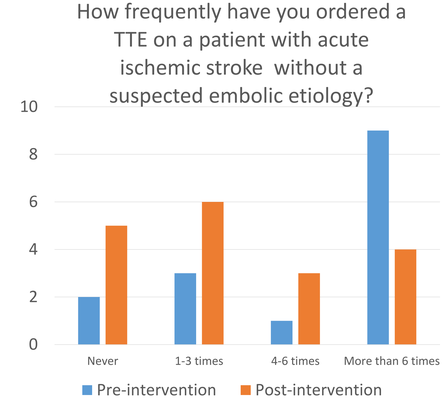
This study was designed to evaluate the challenges encountered when ordering transthoracic echocardiography (TTE) for patients undergoing workup for acute ischemic stroke including delays obtaining the study and if such delays impact length of stay. The study will also explore provider experience with TTE ordering and implement a new process to improve TTE order completion and minimize suspected delays in patient disposition. Additionally, an aim of this study is to evaluate the number of unnecessary TTE orders for better allocation of this resource.

METHODS

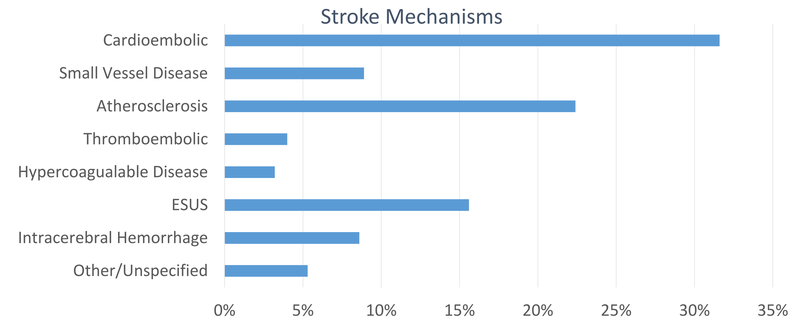
TTE orders were reviewed from May to July 2022, which included patient demographics, suspected stroke mechanism, date of TTE order, date medically ready for discharge, date of TTE completion, and appropriateness of TTE order. The date of echo completion was evaluated against the date of medically ready for discharge to determine if there was a delay in discharge related to the echo order. Orders were compared to our institutional guideline regarding suspected stroke mechanism. A process was implemented to directly communicate with sonographers to prioritize urgent TTE. Providers were surveyed regarding their experience with TTE ordering. We reviewed the above metrics from March to May 2023 after implementation of this process.

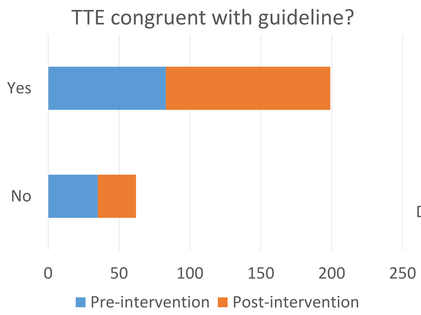
SURVEY RESULTS

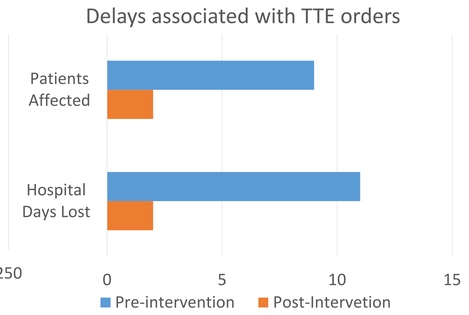




REVIEW RESULTS







RESULTS cont.

There were a total of 118 patients with TTE orders from May to July 2022 in the pre-intervention analysis. There were 143 patients with TTE orders from the post-intervention group from March-May 2023. Pre-existing stroke comorbidities included hypertension (69.4%), Type 2 Diabetes (38.7%), hyperlipidemia (42.3%), atrial fibrillation (14.4%), previous stroke or TIA (32.4%), ischemic heart disease (27.0%), hypercoagulable disease (6.3%h, carotid artery stenosis (1.8%), obstructive sleep apnea (6.3%), migraine (4.5%), seizure (4.5%), congestive heart failure (9.9%), intravenous drug use (6.3%), malignancy (14.4%), and heart valve replacement (2.7%). Prior to implementation of the TTE prioritization process, 87% (n=13) of providers reported that they encountered a delay awaiting TTE versus 17% (n=3) following implementation. Orders were congruent with our institutional guidelines in 70% (n= 83) of pre-intervention TTE orders and 81% (n=116) of our post-intervention TTE orders. Nine patients experienced delay in discharge awaiting TTE in the pre-intervention group versus two following the intervention. This accounted for eleven and two additional hospital days, respectively.

CONCLUSIONS

Following implementation of the communication process with TTE sonographers, there was a decrease in number of providers who encountered delays in patient disposition while obtaining a TTE. There was also a decrease in the number of providers that reported ordering a TTE on a patient with acute ischemic stroke that was suspected to not be related to an embolic source. Additionally, the percentage of patients who were affected by delays following implementation of this protocol decreased. An institutional guideline and an improved communication process between providers and echocardiography technologists can improve TTE prioritization and workflow for inpatient acute ischemic stroke evaluation. Possible confounding variables included hiring of additional sonographers during the period of review, which may have contributed to the observed decrease in delays associated with TTE. Further work on this project will include assessment of the contribution of inappropriate bubble studies to delay, and a cost analysis associated with these hospital delays.

REFERENCES

Kleindorfer, D. O, Williams, L. S. et, al (2021). 2021 Guideline for the Prevention of Stroke in Patients With Stroke and Transient Ischemic Attack: A Guideline From the American Heart Association/American Stroke Association. In Stroke (Vol. 52, Issue 7).

Meenan RT, Saha S, Chou R, Swarztrauber K, Krages KP, O'Keefee-Rosetti M, McDonagh M, Chan BK, Hornbrook MC, Helfand M. Effectiveness and cost-effectiveness of echocardiography and carotid imaging in the management of stroke. Evid Rep Technol Assess (Summ). 2002 Jul 1-10. PMID: 12187569.