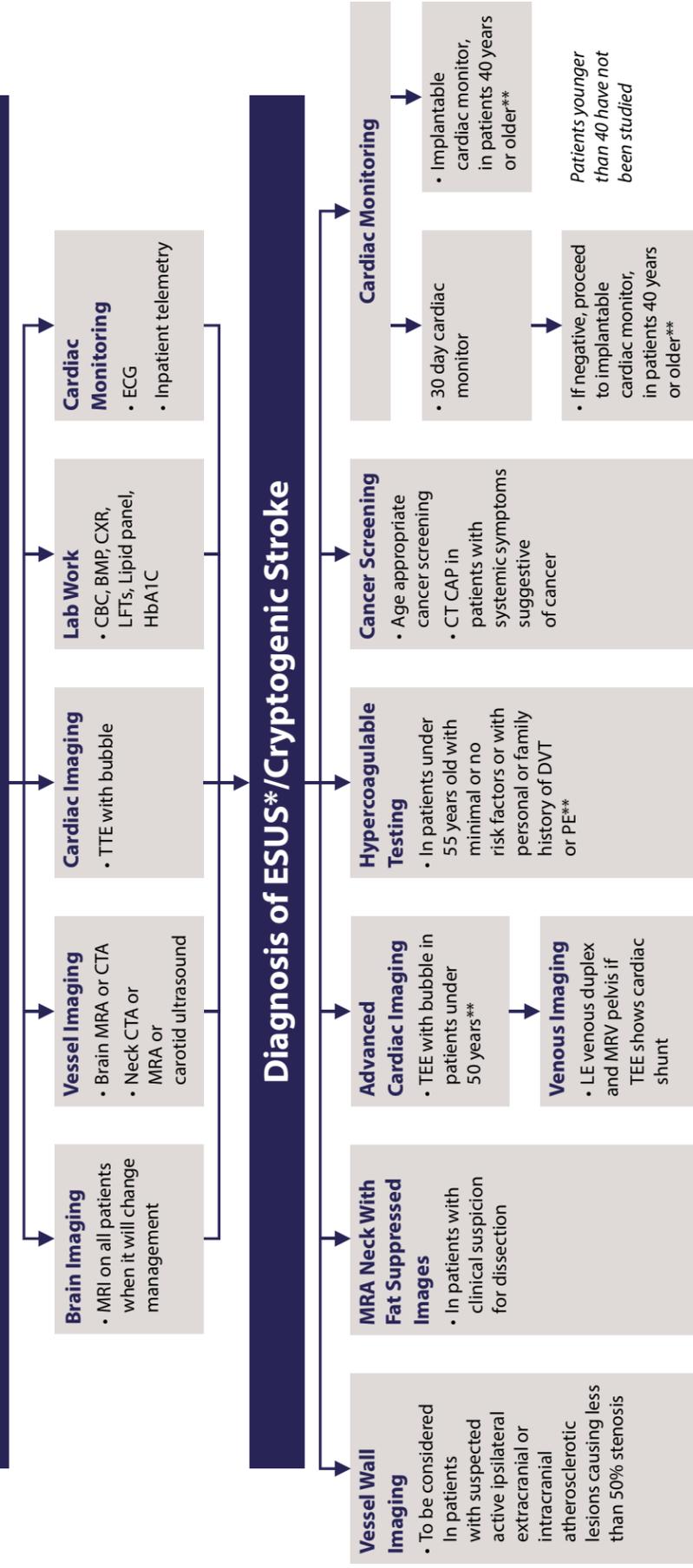


# Cryptogenic Stroke Pathway

## Suspected Stroke – History/Exam/CT brain to exclude hemorrhage



CT: Computerized Tomography; MRI: Magnetic Resonance Imaging; MRA: Magnetic Resonance Angiography; CTA: Computerized Tomography Angiography; TTE: Transthoracic Echocardiography; CBC: Complete Blood Count; BMP: Basic Metabolic Panel; CXR: Chest X-ray; LFTs: Liver Function Tests; HbA1C: Hemoglobin A1C; ECG: Electrocardiogram; TEE: Transesophageal Echocardiography; LE: Lower Extremity; MRV: Magnetic Resonance Venography; ILR: Implantable Loop Recorder; AF: Atrial Fibrillation; DVT: Deep Venous Thrombosis; PE: Pulmonary Embolism; CAP: Chest/Abdomen/Pelvis.

Criteria for Diagnosis of Embolic Stroke of Undetermined Source (ESUS)\*

1. Ischemic stroke detected by CT or MRI that is not lacunar†
2. Absence of extracranial or intracranial atherosclerosis causing  $\geq 50\%$  luminal stenosis in arteries supplying the area of ischemia
3. No major risk cardioembolic source of embolism‡
4. No other specific cause of stroke identified (eg, arteritis, dissection, migraine/vasospasm, and drug abuse)

CT indicates computed tomography; and MRI, indicates magnetic resonance imaging.

\* Requires minimum diagnostic evaluation that includes cardiac rhythm monitoring for  $>24$  hours with automated rhythm detection.†

\*\* Population recommendation based on data when available and decisions should be made based on clinical suspicion/judgement.

† Lacunar defined as a subcortical infarct  $\leq 1.5$  cm ( $\leq 2.0$  cm on MRI diffusion images) in largest dimension, including on MRI diffusion-weighted images, and in the distribution of the small, penetrating cerebral arteries of the cerebral hemispheres and pons.

‡ Permanent or paroxysmal atrial fibrillation, sustained atrial flutter, intracardiac thrombus, prosthetic cardiac valve, atrial myxoma or other cardiac tumors, mitral stenosis, recent ( $<4$  weeks) myocardial infarction, left ventricular ejection fraction  $<30\%$ , valvular vegetations, or infective endocarditis.



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## CRYPTOGENIC STROKE QUALITY IMPROVEMENT PROJECT



# INTRODUCTION

## Cryptogenic Stroke Quality Improvement Project (CSQIP)

### MISSION STATEMENT:

CSQIP seeks to improve clinical outcomes for patients with cryptogenic stroke.

One third of ischemic strokes are deemed cryptogenic (undetermined mechanism), and have historically had inadequate clinical attention given a lack of data and tools with which to diagnose and treat. However, that dynamic has changed and will continue to do so. Despite this fact, many patients are not clearly identified as having had a cryptogenic stroke and do not undergo a rigorous evaluation which may put them at risk for a recurrent stroke.

There are limited to no published recommendations on what pathways hospitals should operationalize in order to work up a patient deemed to have a cryptogenic stroke that include these newer data and technologies. Several practice gaps can be identified in the care of these patients:

- Gap 1: Stroke can be managed most appropriately if there is an understanding of etiology. There are no current standard pathways by which cryptogenic stroke is identified, evaluated and managed.
- Gap 2: Cryptogenic stroke is not “owned” by any one specialty. There is a need for this ownership in transitions of care so that the patient is not lost in the system.
- Gap 3: There is no clear best practice or process by which cryptogenic stroke patients are discharged with good coordination of multidisciplinary follow up.

In response to this overwhelming unmet clinical need, the Neurohospitalist Society has developed this cohesive, unified quality improvement endeavor: the *Cryptogenic Stroke Quality Improvement Project*.

We encourage our membership to implement and then submit *Best Practice Examples* as this pathway is put in place. Please refer to the Cryptogenic Stroke Pathway, Transitions of Care/Metrics and Resources to assist in your quality improvement efforts.

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# TRANSITIONS OF CARE AND NEUROHOSPITALISTS: CRYPTOGENIC STROKE

Care transitions have become an increasing focus in the realm of hospital medicine, and appropriately so. The Centers for Medicare and Medicaid Services (CMS) has made this a priority, largely focusing on readmissions. By introducing a financial penalty, hospital administrators have needed to view this as more than just a patient safety and quality initiative.<sup>1</sup> Beyond readmissions, many if not most hospitals have focused on throughput as well. Throughput refers to the efficiency with which a patient moves through the hospital system – transitioning from the Emergency Department to inpatient status and on through discharge.

High-performing neurohospitalist programs will be integrally involved in the management of care transitions given their applicability to their population of patients in general, but to stroke patients in particular. The timeliness of these transitions is of significant import for patients being treated with thrombolytics or with endovascular intervention. The quality of these transitions is of paramount importance for patients with cryptogenic stroke.

Given the complexity of cryptogenic stroke, the Neurohospitalist needs to create a system of care for these patients. There are a number of ways to develop a system of care. Cryptogenic stroke needs to be identified as a diagnosis in order for the system to be established and recognized by other providers and by Internal Medicine Hospitalists and Cardiologists in particular. Once the diagnosis is made, a clear algorithmic approach is needed. Each hospital or hospital system may have a different methodology, but order sets, pathways and protocols are typically facilitated in an electronic health record (EHR).

Management of cryptogenic stroke is complex and spans both the inpatient and outpatient world. Tests may take time to process and only become available after discharge, and others may need to be done on an outpatient basis. Frequently, the inpatient providers do not have outpatient practices, and there may be limited access to neurologists or other providers in the outpatient realm or patients may not followup consistently. Consideration should be given, in those cases in particular, to performing studies that can be done appropriately during an inpatient stay, or during the transition from inpatient to outpatient. The latter may include performing a test or applying/implanting cardiac monitoring after discharge, but before a patient has left the hospital campus – such as being discharged and going directly to a cardiology clinic.

No matter the process, a clear plan needs to be established at the time of discharge. A physician contact is necessary who will be the primary point person for assuring that results are reviewed and subsequent evaluations/testing performed as needed. Involving patients and their families is ideal so that they are clear on the diagnosis and tests that are planned or pending. Written materials may be helpful in this regard. High performing neurohospitalists will make direct communication by phone with the provider who will be seeing the patient after discharge to assure there is no “voltage drop” in information after discharge from the hospital.

## Take home points

- Large external focus on care transitions and readmissions
- Care transitions need to be actively managed
- Identify a clear system of care
  - Ordersets/pathways/protocols
  - Expedite and assure that appropriate testing is done
  - Written materials for discharge
- Identify and communicate with outpatient provider(s)
  - Assure that tests pending at discharge are followed up

## Proposed metrics for care transitions

- Cryptogenic stroke/ESUS clearly identified in discharge diagnosis/diagnoses
- Readmission within 7 and 30 days
- Time to follow up with outpatient neurologist, cardiologist, primary care provider
- Receipt of written discharge materials
- Appropriate testing performed per protocol/algorithm – inpatient and outpatient

<sup>1</sup> <https://www.cms.gov/medicare/medicare-fee-for-service-payment/acuteinpatientpps/readmissions-reduction-program.html>

