



Implantation of Implantable Loop Recorder to Detect Occult Atrial Fibrillation: An Initiative of the Cryptogenic Stroke Task Force

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BACKGROUND

Cryptogenic strokes account for 25-30% of ischemic strokes that have an undetermined cause despite an extensive work up. Atrial fibrillation (AF) is a common risk factor for stroke, but is often undetected as it may be paroxysmal or asymptomatic. Due to its embolic phenomenon, if untreated with long term anticoagulation, AF increases the risk of recurrent stroke by 67%. As such, the American Heart and Stroke Association recommend the placement of a portable Holter monitor that may detect an occult arrhythmia in cardiogenic strokes. Duration of the traditional Holter monitor has a limited time frame of 2-30 days and may miss the presence of AF, since the median time of AF detection in patients with cryptogenic stroke was found to be 84 days in the CRYSTAL-AF trial. Implantable loop recorders (ILRs) are small subcutaneous devices that can record electrocardiograms up to three years and has high sensitivity and specificity for identifying patients with AF.

PROJECT AIM

The Cryptogenic Stroke Task Force (CSTF) is a collaboration between Neurology and Cardiology that has formulated a **Cryptogenic Stroke Pathway** to ensure that patients with cryptogenic strokes are rapidly evaluated and if appropriate, referred for implantation of an ILR to detect occult AF. Through implementation of this protocol, we aim to increase detection and treatment of AF to decrease the risk of recurrent strokes.

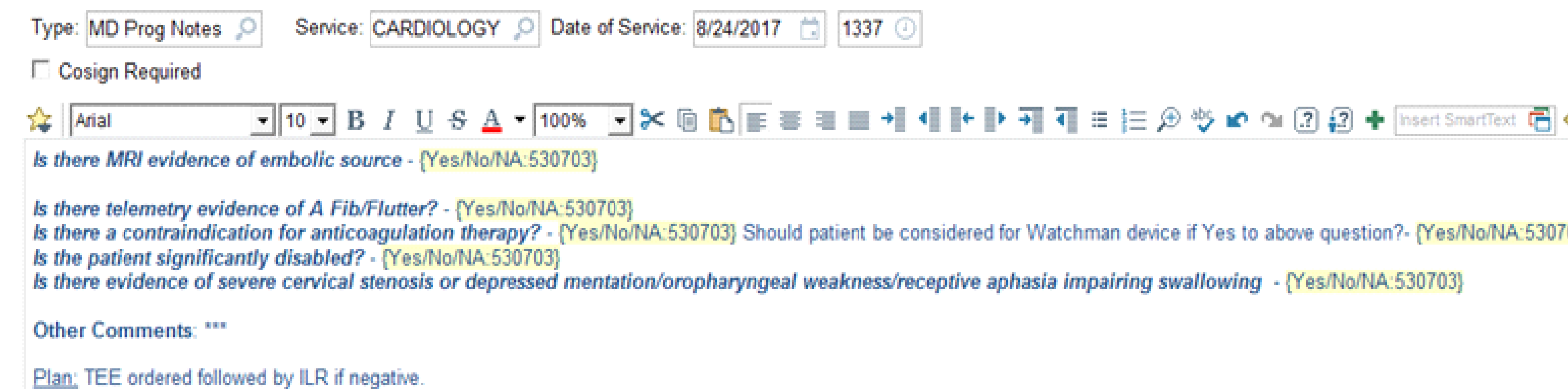
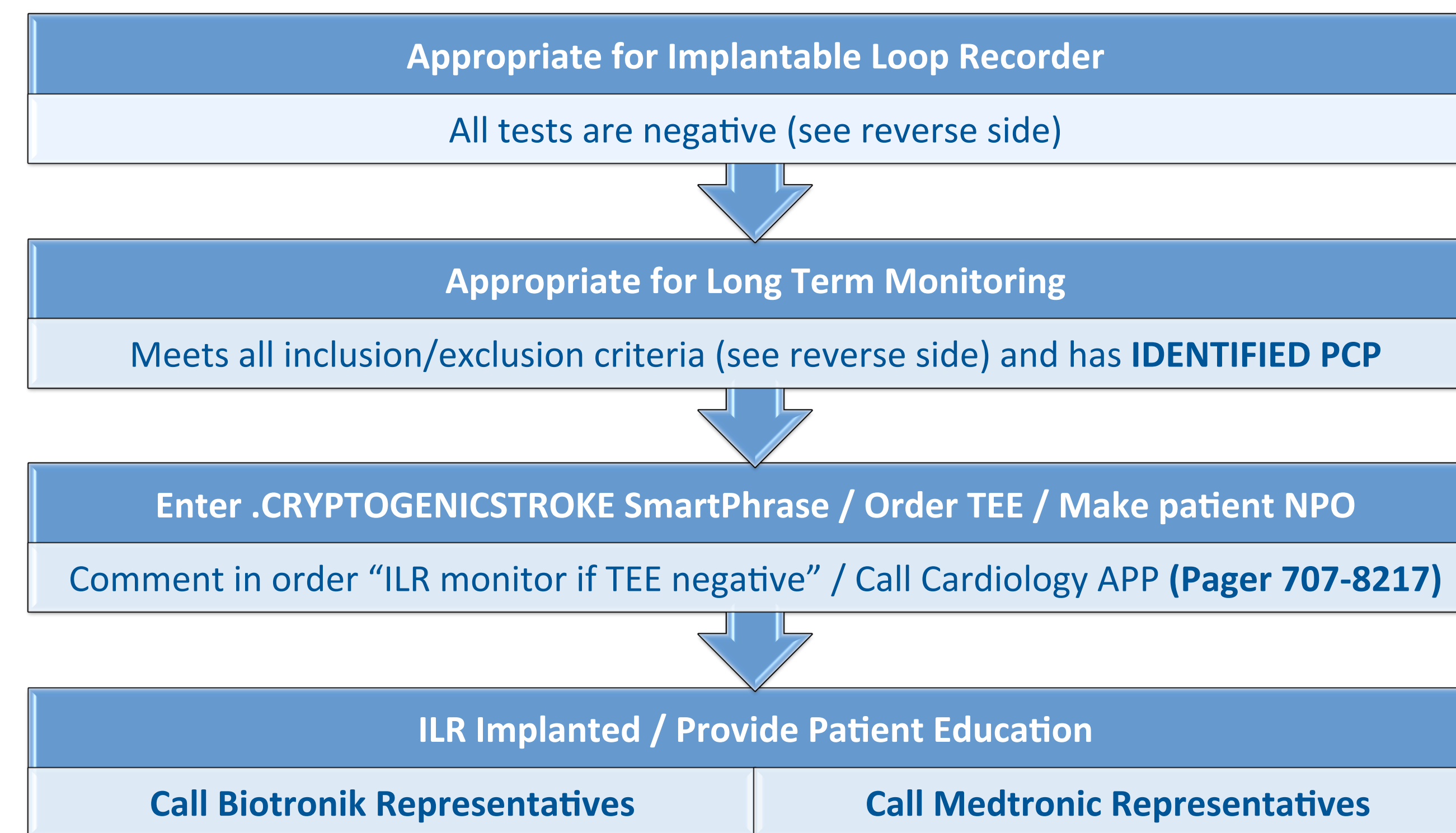
PROJECT DESIGN/STRATEGY

An ILR was recommended and indicated for patients with the following conditions:

1. An embolic large vessel ischemic infarct with no identified source of stroke
2. Transient symptoms such as dizziness, palpitations, syncope and chest pain who are at increased risk of cardiac arrhythmias

The pathway delineates patient inclusion and exclusion criteria, required diagnostic testing, patient referral/implantation and party responsibilities. Staff, residents and physicians were provided with reference pocket cards (Figure 1A and B) and the pathway was integrated into the Neurology resident orientation program (Figure C).

PROJECT STEPS and METRICS



(Back side of pocket card)

Tests (Implant if all are negative)

- 12-lead ECG
- ≥ 24 hours of ECG monitoring
- TTE (Transthoracic Echocardiography)
- **TEE (Transesophageal Echocardiography) Negative/NO Thrombus Pre-requisite for ILR Insertion**
- Screening for thrombophilic states (<60 years old)
- MRA, CTA or catheter angiography of the head and neck

Inclusion Criteria

- Stroke detected by CT or MRI that is not lacunar
- Absence of extracranial or intracranial atherosclerosis causing ≥50% stenosis
- No major-risk cardioembolic source of embolism
- No other specific cause of stroke identified (arteritis, dissection, migraine/vasospasm, drug misuse)
- TIA - ABCD₂ score of ≥4 or aphasia, slurred speech, unilateral weakness
- CHADS₂ ≥2

Exclusion Criteria

- Indication for chronic anticoagulation or already on anticoagulation

Figure 1. Reference pocket cards and SmartPhrase for the Cryptogenic Stroke Pathway. A) Front side of reference pocket card with algorithm for initiating the pathway and necessary contact numbers. B) Back side of reference pocket card outlining ILR inclusion and exclusion criteria. C) SmartPhrase that was created for Neurology residents and physicians to document when implementing the Cryptogenic Stroke Pathway.

RESULTS/OUTCOMES

The Cryptogenic Stroke pathway was fully implemented December 1, 2016. Between Jan 1, 2016 to Nov 30, 2016, 5 ILRs were placed in patients with cryptogenic stroke. There was a 580% increase in the number of ILR placements in cryptogenic stroke patients post implementation of the Cryptogenic Stroke Pathway.

- With implementation of the protocol:
- 31% decrease in the number of ILRs placed in the outpatient setting
 - Time from stroke admission date to ILR implant decreased from 34.9 to 0.8 days

Abbreviations:

AF: atrial fibrillation
ILR: implantable loop recorder
TEE: transesophageal echocardiogram

Table 1. Data after implementation of protocol

	Post-Protocol 12/1/16 - 9/1/17
Number of Patients	34
Age (median, years)	59
Age (mean, years)	48
Male (n, %)	20 (59%)
Female (n, %)	14 (41%)
White (n, %)	25 (74%)
African American (n, %)	8 (24%)
Hispanic (n, %)	1 (2%)
Multi-territory (n, %)	19 (56%)
Number of ILR Placed Outpatient (n, %)	3 (9%)
Number of ILR Placed Inpatient (n, %)	31 (91%)
Number of TEE Performed (n, %)	31 (91%)
Time from TEE to ILR Placement	
Median (days)	1
Mean (days)	0.8
Time to ILR Placement from Admission	
Median (days)	3
Mean (days)	7.3
Documented AF (n, %)	4 (12%)

CHALLENGES and LESSONS

Challenges include management of stroke patients admitted to numerous inpatient units with several different providers. While patients on the Neurology service are usually considered for ILR if indicated, off-service providers are not as familiar with the protocol. Additional challenges included consistent communication between neurology and cardiology. The communication challenge was addressed with the creation of a physician implemented SmartPhrase in the electronic health record to streamline communication between neurology and cardiology. Opportunities identified to enhance post-discharge follow-up for arrhythmia detection. Cardiology was unable to absorb additional patient volume therefore, Primary Care Providers were responsible for AF treatment follow-up. Having an established Primary Care Provider prior to ILR placement was a challenge.

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