Electrophysiological Study (EPS) - Single Service

Clinical Guidelines for Medical Necessity Review

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Important Notices

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Guideline Information:

Specialty Area: Cardiovascular Disease
Guideline Name: Electrophysiological Study (EPS) (Single Service)

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Type: [**X**] Adult (18+ yo) | [**X**] Pediatric (0-17yo)

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Medical Necessity Criteria

Service: Electrophysiological Study (EPS)

General Guidelines

- **Units, Frequency, & Duration:** One instance, as indicated by clinical guidelines.
- **Criteria for Subsequent Requests:** None.
- **Recommended Clinical Approach:** An electrophysiology study (EPS) is a procedure used to evaluate the electrical activity within the heart. It involves inserting catheters into the heart to measure electrical signals and to diagnose and treat various cardiac arrhythmias (abnormal heart rhythms).
    - EPS for the evaluation of manifest high-grade AV block is recommended when conduction disease is suspected, and non-invasive testing does not reveal the location of the AV block. EPS can identify infranodal conduction disease, which can determine if a patient requires permanent pacing. While EPS can be used to evaluate AV nodal function, the study is typically part of a comprehensive EPS for other arrhythmias, especially when symptoms suggest ventricular arrhythmias.[1]
    - There is no specific indication for EPS to evaluate sinus node dysfunction. However, EPS may be considered when conduction disease is suspected and when non-invasive testing does not reveal an AV block.[1] While there are maneuvers during an EPS that can evaluate sinus node recovery, the study is typically part of a comprehensive EPS for other arrhythmias. This includes atrial fibrillation or flutter, which can be associated with sinus node dysfunction in tachy-brady syndrome.
    - Catheter ablation is an acceptable first-line therapy for the treatment of supraventricular tachycardia (SVT). It can be used prior to medication due to its high success and low complication rate. Arrhythmia substrate can be approached using radiofrequency or cryothermal energy, depending on location. Cryoablation has dramatically reduced the probability of inadvertent AV block during ablation procedures.[2-3] EPS describes the diagnostic studies performed to evaluate the cardiac electrical system, usually prior to catheter ablation during the same procedure. Occasionally, diagnostic EPS is used to assess the risk for life-threatening arrhythmias, especially in the

decision-making process for an implantable cardioverter defibrillator (ICD) implant.[4]
    - EPS for the evaluation of syncope is dependent on the presence of another cardiac disease.[5] In the absence of known cardiac disease, the yield of an EPS is approximately 10%.[6] EPS is recommended if clinical arrhythmias are detected during ambulatory monitoring and could benefit from interventions such as ICD implantation, ablation, or permanent pacemaker insertion. Furthermore, EPS may be warranted if conduction abnormalities are suspected, particularly if non-invasive testing fails to identify an AV block.[1] Particular techniques employed during an EPS can assess the recovery of the sinus node. These maneuvers are commonly integrated into a thorough EPS designed to address various arrhythmias like atrial fibrillation or flutter, both of which may correlate with sinus node dysfunction in tachy-brady syndrome. EPS may be indicated when a patient presents with syncope and displays a Brugada pattern on ECG; however, the findings are controversial.[7]
    - EPS is utilized for patients with congenital heart disease, including preoperative screening for an Ebstein's anomaly to determine the presence of accessory pathways and those with Tetralogy of Fallot (TOF) for inducible ventricular arrhythmias. Some procedures may lead to ablation of the arrhythmogenic substrate (or cause of the arrhythmia) or lead to a decision to implant a defibrillator, especially when hemodynamic risk factors are present that could increase the risk of sudden cardiac death.[8]
- **Exclusions:** None.

Medical Necessity Criteria

Indications

➔ **Electrophysiological Study (EPS)** is considered appropriate if **ANY** of the following is **TRUE**:

- ◆ Symptomatic or significant bradycardia (sinus node dysfunction, AV block, etc.) with inconclusive non-invasive evaluation(s) (e.g., extended ECG monitoring, stress testing)[1,7]; **OR**
- ◆ Complex congenital heart disease with **ANY** of the following[4]:
    - Nonsustained ventricular tachycardia; **OR**
    - Unexplained syncope in patients who are known to have high-risk substrate (e.g., Tetralogy of Fallot, L-looped transposition of the great arteries (L-TGA)) for ventricular arrhythmias; **OR**
- ◆ Congenital heart disease with **ALL** of the following:

- All evaluations were inconclusive, including comprehensive ECG monitoring and stress testing; **AND**
- **ANY** of the following symptoms of significant rhythm abnormalities:
  - Chest pain; **OR**
  - Palpitations; **OR**
  - Shortness of breath; **OR**
  - Syncope; **OR**

- Focal atrial tachycardia, which is the likely etiology of new cardiomyopathy; **OR**
- Following an episode of pre-excited atrial fibrillation[2]; **OR**
- For risk stratification of Brugada Syndrome with spontaneous or induced Type 1 ECG pattern[7,10]; **OR**
- Implantable cardioverter defibrillator (ICD) indications are not met due to **ANY** of the following[7]:
  - Adult congenital heart disease; **OR**
  - Ischemic cardiomyopathy; **OR**
  - Nonischemic cardiomyopathy; **OR**
- Ischemic cardiomyopathy with **ALL** of the following[7]:
  - Ejection fraction (EF) less than or equal to 40%; **AND**
  - Non-sustained ventricular tachycardia (NSVT) to determine inducibility of sustained VT or ventricular fibrillation; **AND**
  - Need for ICD implant; **OR**
- Manifest ventricular pre-excitation, which would interfere with certain types of employment (e.g., pilots, military service)[3]; **OR**
- Pre-surgical surgical intervention on the tricuspid valve and the patient has an Ebstein anomaly[8,11]; **OR**
- Supraventricular tachycardia (SVT) that is symptomatic or sustained[12]; **OR**
- **ANY** of the following related to syncope:
  - Evaluation following myocardial infarction if non-invasive monitoring is unrevealing; **OR**
  - Unexplained syncope with inconclusive non-invasive evaluation(s) (e.g., extended ECG monitoring, stress testing); **OR**
  - With bifascicular block and ventricular arrhythmias is suspected[1]; **OR**
- Tachyarrhythmia and **ANY** of the following are being considered[7]:
  - Automatic ICD; **OR**
  - Mapping and ablation; **OR**
- Ventricular arrhythmia(s) with an indication for invasive evaluation of other conduction diseases[1]; **OR**
- Ventricular pre-excitation pattern in an asymptomatic patient and EPS is to determine **ANY** of the following:

        - Inducibility of atrioventricular reentrant tachycardia (AVRT); **OR**
        - The rapidity of antegrade conduction as a risk factor for sudden cardiac arrest; **OR**
    - Wolff-Parkinson-White (WPW) pattern with syncope.

Non-Indications

- ➔ **Electrophysiological Study (EPS)** is not considered appropriate if **ANY** of the following is **TRUE**:
    - **ANY** of the following as indicated by patient symptoms with other outpatient testing:
        - Symptomatic AV block; **OR**
        - Symptomatic sinus bradycardia (arrest)[7]; **OR**
    - Non-sustained, asymptomatic supraventricular tachycardia; **OR**
    - Risk assessment for an implantable cardioverter defibrillator (ICD) indication and the patient has heart failure with an ejection fraction (EF) less than or equal to 35%[13]; **OR**
    - Syncope associated with arrhythmias that are indications for pacemaker or ICD implantation[7]; **OR**
    - Tachyarrhythmias associated with syncope or near syncope and coronary intervention may be needed in the near future.[7]

Level of Care Criteria

Outpatient

Procedure Codes (CPT/HCPCS)

CPT/HCPCS Code	Code Description
93600	Bundle of His recording
93602	Intra-atrial recording
93603	Right ventricular recording
93610	Intra-atrial pacing
93612	Intraventricular pacing
93618	Induction of arrhythmia by electrical pacing
93619	Comprehensive electrophysiologic evaluation with insertion and repositioning of multiple electrode catheters, with right atrial pacing and recording, right

	ventricular pacing and recording, and His bundle recording
93620	Comprehensive electrophysiologic evaluation with insertion and repositioning of multiple electrode catheters, with attempted induction of arrhythmia, with right atrial pacing and recording, right ventricular pacing and recording, and His bundle recording
93624	Electrophysiologic follow-up study with pacing and recording to test effectiveness of therapy with attempted induction of arrhythmia
93631	Intra-operative epicardial and endocardial pacing and mapping to localize the site of tachycardia or zone of slow conduction for surgical correction
93653	Comprehensive electrophysiologic evaluation with insertion and repositioning of multiple electrode catheters, with attempted induction of arrhythmia, with right atrial pacing and recording, with treatment of supraventricular tachycardia by ablation
93654	Comprehensive electrophysiologic evaluation with insertion and repositioning of multiple electrode catheters, with attempted induction of arrhythmia, with right atrial pacing and recording, with focus of ventricular ectopy
+93623	Programmed stimulation and pacing after intravenous drug infusion (List separately in addition to code for primary procedure)
+93655	Intracardiac catheter ablation of a discrete mechanism of arrhythmia which is distinct from the primary ablated mechanism, including repeat diagnostic maneuvers, to treat a spontaneous or induced arrhythmia
+93662	Intracardiac echocardiography during therapeutic/diagnostic intervention, including imaging supervision and interpretation
+93462	Left heart catheterization by transseptal puncture

	through intact septum or by transapical puncture

Medical Evidence

Waldmann et al. (2023) conducted a prospective multicenter study to systematically evaluate electrophysiological studies (EPS) using programmed ventricular stimulation in Tetralogy of Fallot (TOF) patients undergoing assessment for PVR between January 2020 and December 2021. A uniform stimulation protocol was implemented across all participating centers. A cohort included 120 patients (mean age of 39.2±14.5 years; 53.3% males). Sustained ventricular tachycardia (SVT) was induced in 27 (22.5%) patients. The critical isthmus most frequently implicated (90.0%) was identified between the ventricular septal defect patch and pulmonary annulus. Factors independently associated with inducible ventricular tachycardia included a history of atrial arrhythmia and pulmonary annulus diameter greater than 26 mm. EPS findings prompted significant management alterations in 23 (19.2%) cases, including catheter ablation (CA) in 18 (15.0%), surgical cryoablation during pulmonary valve replacement (PVR) in 3 (2.5%), and defibrillator implantation in 9 (7.5%) cases. During a follow-up period of 13 (6.1-20.1) months, no patients experienced sustained ventricular arrhythmias. The authors conclude that the systematic performance of programmed ventricular stimulation in TOF patients undergoing evaluation for PVR reveals a notable rate of inducible ventricular tachycardia and holds the potential to influence treatment strategies. Further research is warranted to ascertain whether adopting a standardized treatment approach based on EPS outcomes will translate into improved clinical outcomes.[14]

Oliveira et al. (2023) performed a retrospective study to identify predictors associated with the lack of referral for CA as the initial treatment option in SVT patients. Various clinical and demographic factors were treated as independent variables, while non-referral for CA as the primary treatment was considered the dependent variable in a stepwise logistic regression analysis. Out of 350 patients, 20 clinical-demographic variables were examined, with 10 initially included in the logistic regression analysis: age, gender, presence of pre-excitation on ECG, palpitations, dyspnea, chest discomfort, number of antiarrhythmic drugs prior to ablation, number of concomitant symptoms, duration of symptoms, and emergency room visits due to SVT. Following multivariable adjusted analysis, age, chest discomfort during SVT, and the number of antiarrhythmic drugs administered before ablation emerged as independent predictors positively associated with the lack of referral for CA as the first-line treatment for SVT. Overall, the study suggests that certain independent predictors contribute to the underutilization of catheter ablation as the initial treatment option for SVT.[3]

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