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Logistics: Routine Follow-Up for Pacemakers

Typical routine evaluation frequency:
For Dual Chamber Brady pacing
  1 device interrogation up to every 180 days
For Single Chamber Brady pacing
  1 device interrogation up to every 365 days
Medical necessity plays a role in other emergent follow-up.

Comprehensive planning for follow-up includes both in-person checks and remote monitoring. At remote monitoring, interrogation is replaced with print-outs of the most recent LATITUDE NXT report and remote access to and review of applicable Arrhythmia Logbook reports.

Medical necessity plays a role in other emergent follow-up.

A key element of LATITUDE NXT follow-up is ensuring that findings from the last remote follow-up:
become part of the next regularly scheduled clinic visit of the patient
influence timing of upcoming in-person follow-up visits.
Logistics: Routine Follow-Up for Pacemakers

Typical routine evaluation frequency:

For **Dual Chamber** Brady pacing
- 1 device interrogation up to every 180 days

For **Single Chamber** Brady pacing
- 1 device interrogation up to every 365 days

**Medical necessity** plays a role in other emergent follow-up.

**KEY CONCEPT**

For coding purposes, there are differences between in-person follow-up and remote monitoring.

These are defined by device type:
- billing frequency codes for technical and professional components.

**NOTES**

For specific guidelines consult the [Billing and Coding Guide](#).
Indications for Bradycardia Pacing

- Sinus Node Dysfunction (includes pacing for Chronotropic Incompetence (CI))
- Acquired AV Block
- Chronic Bifascicular Block
- AV Block Associated With Acute Myocardial Infarction
- Hypersensitive Carotic Sinus Syndrome and Neurocardiogenic Syncope
- Children, Adolescents and Patients With Congenital Heart Disease

Figure 3. The primary indications for bradycardia pacing. Dual chamber pacemakers are most frequently implanted for sinus node disease. Single chamber pacemakers are most frequently implanted for permanent atrial fibrillation (AF).

Indications for pacemaker include:
1. Sinus node dysfunction
2. AV block.

A dual chamber pacemaker has one lead in the atrium and one in the ventricle.

A single chamber pacemaker has one lead, typically in the ventricle.

Each lead is capable of monitoring patient rhythm and offering therapy based on the physician prescription.
Pacing Strategies: The Dual Chamber System

Figure 4. A Typical Dual Chamber System—an intracardiac right ventricular and right atrial lead with a pacemaker or pulse generator (PG).

**KEY CONCEPT**

Use the advantages of the dual chamber system to enhance patient hemodynamics:

1. Monitor intrinsic events
2. Ensure optimal AV filling time
3. Pace only as needed.

**NOTES**

At follow-up make sure that the pacemaker:

- Senses
- Captures.
At follow-up ensure the pacemaker uses the single chamber system to

- Monitor intrinsic events
- Pace only as needed

At follow-up make sure that the pacemaker:

- Senses
- Captures

Figure 5. A Typical Single Chamber System--an intracardiac right ventricular lead with a pacemaker or pulse generator (PG).
Tasks Associated with Remote Follow-Up

1. Review patient indication/history.
2. Interrogate and interpret:
   - Presenting rhythm and device status
   - Event counters, trend diagnostics
3. Assess data and confirm normal operation/exceptions.
4. Discuss and gain agreement about how to address exceptions.
   - For example, ask the patient to transmit information again.
   - For example, ask the patient to come to clinic for testing.
5. Confirm/document final settings/ECG.

Goals of Brady pacemaker follow-up:
- Maintain sensing and pacing safety margins
- Assess AV timing
- Pace as needed
- Assess lead integrity
- Assess patient symptoms
- Monitor rhythm changes
- Communicate such changes to physician, as needed

See the detailed step-by-step follow-up protocol at the end of this module.

Figure 6. An abbreviated list of the most important follow-up tasks for monitoring ongoing safe pacemaker operation at remote follow-up.
Figure 7. A schematic outlining the important points in remote follow-up, shown increasingly to be the best method for detecting issues earlier and for identifying clinically actionable events.²

Collaborative Care Model

KEY CONCEPT

For thorough follow-up, explore:

- Patient indication
- Patient symptoms
- What programming changes would make a difference?

A detailed how-to guide is available at the end of this module.

NOTES

How does the current follow-up compare to the patient’s last follow-up?
Interpreting a LATITUDE NXT Combined Follow-Up Report:

Presenting Rhythm

1. What “face” of dual chamber pacing best characterizes the way that the patient is using the pacer? AS-VS; AS-VP; AP-VP; AP-VS

2. What is the patient’s rate?

3. Review the marker channel on this and the following page. Does each marker correspond to an event on the atrial or ventricular channel?
Interpreting a LATITUDE NXT Combined Follow-Up Report: Presenting Rhythm

4. What is the patient’s likely pacemaker indication?

5. Is the pacemaker sensing/pacing successfully?

6. How is rate response presently contributing to the patient’s rate?

7. Based on the presenting rhythm, is there any immediate action required?
Interpreting a LATITUDE NXT Combined Follow-Up Report:

Programmed Parameters

1. What is the programmed mode? What pacemaker operation do we expect with a Lower Rate of 60 ppm and this mode?

2. What is “tracking” and what pacemaker operation do we expect with a Maximum Tracking Rate of 130 ppm?

3. What do the Paced AV and Sensed AV Delays do?

4. What role do the Paced AV and Sensed AV Delays play with regard to the amount of ventricular pacing?

5. Based on the information we have reviewed thus far, do we need to take action?
Interpreting a LATITUDE NXT Combined Follow-Up Report:

Checking Battery / Time to Explant

1. When does “time to explant” become critical?
2. What is the pacemaker’s Magnet Rate?
3. Why is it advantageous to know the pacemaker’s magnet rate?
Interpreting a LATITUDE NXT Combined Follow-Up Report:

Lead Integrity

1. What is the normal range for pacing impedance?

2. What would an impedance of 150 ohms indicate?

3. What does an impedance of > 3000 ohms indicate?

4. What if you see borderline readings? Or occasional low or high readings?

5. Based on the results you see on this patient’s report, what action is required?
Interpreting a LATITUDE NXT Combined Follow-Up Report:

Sensing and Sensitivity Settings

1. How’s the sensing on the atrial lead?

2. In percent what is the variation between the sensing measurements on the atrial lead?

3. How’s sensing on the ventricular lead?

4. Is there a sensing safety margin programmed for the pacemaker given the signal amplitude?

5. With the sensitivity amplitudes programmed, how will the pacemaker avoid oversensing?

6. If the patient develops atrial fibrillation, will the pacemaker’s sensitivity setting be able to sense the tiny signals that AF produces?
Interpreting a LATITUDE NXT Combined Follow-Up Report:
Pacing Thresholds and Pacing Outputs

1. How are the atrial thresholds?

2. How about the ventricular thresholds?

3. What constitutes a voltage safety margin in pacing? Do the present outputs match the safety margin?

4. Do the measures and settings satisfy or is there something you would like to do now that you have seen the condition of the pacing system from multiple vantage points?
Interpreting a LATITUDE NXT Combined Follow-Up Report

How do the trend data on this page confirm or extend our understanding of this patient?
Interpreting a LATITUDE NXT Combined Follow-Up Report:

Trends

How do the trend data on this page confirm or extend our understanding of this patient?
Interpreting a LATITUDE NXT Combined Follow-Up Report:

Histogram Data

How does the rate histogram data confirm or extend our understanding of this patient?
A sample from the patient’s arrhythmia logbook. RAAT entries list automatic atrial threshold measurements.
Interpreting a LATITUDE NXT Combined Follow-Up Report:

Arrhythmia Logbook:

Atrial Tachy Response Episode
Interpreting a LATITUDE NXT Combined Follow-Up Report:

Arrhythmia Logbook:

Non-Sustained VT
Interpreting a LATITUDE NXT Combined Follow-Up Report:

Arrhythmia Logbook:

Non-Sustained VT
Brady Follow-Up Checklist for LATITUDE NXT

Print out the patient’s most recently transmitted LATITUDE NXT report.

NOTE: These steps may be completed out of order. However, it is imperative that each step is completed for a safe and thorough evaluation.

___ Evaluate presenting rhythm strip
___ Evaluate the system summary screen. Check battery status.
___ Review the Patient Information screen (lead models, notes).

Review patient indication
___ Review pacing parameters (mode, LRL, AV Delay, MTR, features)

Events
___ Arrhythmia Logbook (evaluated new EGMs recorded since previous session)
___ Evaluate histograms for rate distribution
___ Evaluate counters
___ Atrial and ventricular pacing percentages
___ Atrial burden
___ Ventricular counters
___ Trends
___ Evaluate MV sensor trending

Evaluate lead test values
___ Intrinsic amplitudes (ensure 2:1 safety margin in sensitivity)
___ Lead impedances
___ Threshold testing in both chambers (ensure 2:1 safety margin)
___ Assess above numbers for abnormal measurements

Plan for programming changes as appropriate (per physician’s orders)
___ For example, decrease outputs to chronic settings
___ Enable rate response based on histogram/counter data
___ Evaluate troubleshooting issues
___ Save reports
___ Dismiss patient from For Review list
___ Document findings on clinic specific forms
___ Provide printouts/documentation to clinic; alert physician, as needed
___ As needed, schedule urgent in-clinic visit
References
