Decision Guide For Managing Conduction Disturbances After TAVR

1 **PRE-TAVR PATIENT ASSESSMENT AND GUIDANCE**

Pre-TAVR Timeframe: In the office and up to the day of the procedure.

Instructions: Evaluate whether a patient is at increased risk for developing a pre-TAVR conduction disturbance and take steps to prepare for and mitigate risk.

ASSESS RISK

Assess patient for the most common risk predictors for developing a conduction disturbance related to a TAVR procedure.

Note: The list below does not represent all possible risk factors.

ECG Predictors*	Procedural Features*	CT Predictors*
• Right bundle branch block • First-degree heart block	• Self-/mechanically expanding prosthesis • Prosthesis/LVOT diameter >1 • Low anticipated implantation depth • Anticipated pre- or post-deployment balloon valvuloplasty	• Heavy calcification below the cusp • Short membranous septum

Patient is considered *INCREASED RISK* if they have any of the indications above.

EXIT PATHWAY

If patient is determined *NOT* to be at increased risk, *EXIT* pathway.

MITIGATE INCREASED RISK

Suggested Pre-TAVR Plan for Increased-Risk Patients	
Patient Counseling/ Consent	• Counsel patient that their risk of need for PPM is higher owing to existing risk factors.
Pre-Procedural Testing/ Monitoring	• Screen patient for signs or symptoms of rhythm disturbances and indications for outpatient ambulatory monitoring.
Medications	• Continue guideline-based medications for coronary artery disease and/or heart failure despite identified risk of need for PPM after TAVR. • Continue medications that may be negatively dromotropic if they are essential for optimal care (e.g., beta blockers for ischemic heart disease and/or LV dysfunction).
Scheduling	• Schedule TAVR at a time when physicians trained in PPM procedure are available within 24 hours.
Procedural/Equipment Considerations	• Consider selecting the transcatheter heart valve associated with lowest risk of heart block based on the implanting team's experience. *The following steps are reasonable, but are ultimately at the discretion of the treatment team:* • Consider implantation of a secure pacing lead prior to the procedure, usually via an internal jugular venous approach. • Consider access and use the internal jugular vein for both pacing during the procedure and temporary pacing if the need arises as a result of the procedure.

CT = computed tomography; ECG = electrocardiogram; LVOT = left ventricular outflow tract; NCC = neurocysticercosis; PPM = permanent pacemaker; RBBB = right bundle branch block; TAVR = transcatheter aortic valve replacement

*Specific predictors are described in the text. Those most established include RBBB (ECG predictors), self-expanding valve, anticipated low-implant (procedural predictors), heavy calcification under NCC,membranous septum length (CT predictors).

Reference: Lilly S, Deshmukh AJ, Epstein AE, Ricciardi MJ, Shreenivas S, Velagapudi P, Wyman JF. 2020 ACC Expert Consensus Decision Pathway on Management of Conduction Disturbances in Patients Undergoing Transcatheter Aortic Valve Replacement: a report of the American College of Cardiology Solution Set Oversight Committee. J Am Coll Cardiol 2020;XX:XXX-XX.

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2 INTRAPROCEDURAL TAVR MANAGEMENT

Intraprocedural TAVR Timeframe: The day of the procedure until completion of procedure.

Instructions: Prepare and plan ahead for management of conduction disturbance if and when they do occur as part of the procedure.

	If...	Then →	Suggested Intraprocedural TAVR Plan
Prior to Start of Procedure	Pre-TAVR assessment indicated that patient is at increased risk for conduction disturbances: Patient has increased-risk **procedural** factors:	→	Continue guideline-based medications for coronary artery disease and/or heart failure despite identified risk of need for PPM after TAVR. Revisit the necessity of a secure pacing lead, internal jugular versus femoral venous access, given increased risk of need for PPM. • Consider implantation of secure pacing lead prior to the procedure, usually via an internal jugular vein. • Access and use the internal jugular vein for both pacing during the procedure and temporary pacing if the need arises as a result of the procedure. Discuss potential for PPM and obtain consent in clinic where feasible.
For All patients during procedure	***Irrespective of the type of temporary lead implanted, all patients should be monitored on a telemetry unit with ability to do emergency pacing if required.***		
During and Until Completion of Procedure	No new conduction disturbance	→	Temporary pacemaker and venous sheath can be removed before the patient leaves the procedure room.
	Develops conduction disturbance (e.g., LBBB, PR/QRS duration ≥20 msec) that may require further pacing	→	Internal jugular venous access with a secure pacing lead prior to leaving the procedure room is **reasonable** for patients with new conduction disturbance but ultimately at the discretion of the implantation team.
	Develops transient complete heart block	→	Internal jugular venous access with a secure pacing lead prior to leaving the procedure room is **reasonable** for patients with transient heart block but ultimately at the discretion of the implantation team.
	Develops persistent complete heart block	→	Internal jugular venous access with a secure pacing lead prior to leaving the procedure room is **indicated** for patients with sustained heart block.
	Pre-existing conduction disturbance with indication for PPM	→	It is preferable to separate the procedures so that informed consent can occur, and the procedures can be performed in their respective spaces with related necessary equipment and staff. It may be reasonable to perform the PPM procedure on the same day as the TAVR procedure if: • PPM is indicated • Informed consent has occurred • Appropriate teams and specialty equipment are available.
	Pre-existing conduction disturbance and a secure pacing lead in place	→	Monitor on a telemetry unit, with temporary pacemaker attached and programmed to provide back-up pacing if required.
	Multiple factors that additively confer increased risk but individually do not	→	Monitor on a telemetry unit, with temporary pacemaker attached and programmed to provide back-up pacing if required

LBBB = left bundle branch block; PPM = permanent pacemaker; TAVR = transcatheter aortic valve replacement

Reference: Lilly S, Deshmukh AJ, Epstein AE, Ricciardi MJ, Shreenivas S, Velagapudi P, Wyman JF. 2020 ACC Expert Consensus Decision Pathway on Management of Conduction Disturbances in Patients Undergoing Transcatheter Aortic Valve Replacement: a report of the American College of Cardiology Solution Set Oversight Committee. J Am Coll Cardiol 2020;XX:XXX-XX.

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3 **POST-TAVR MANAGEMENT**

Post-TAVR Timeframe: From completion of procedure through 30 days post-discharge.

Instructions: Manage and monitor patients who do develop a conduction disturbance

	If the Patient Aligns with Any of These Scenarios	Then →	Suggested Post-TAVR Plan
PPM/EP Study	Symptomatic bradycardia or persistent, complete heart block	→	PPM.
	New, progressive, or pre-existing conduction disturbance that changes post-procedure	→	Monitor, consider EP study and PPM.
	Narrow QRS before and after TAVR	→	EP study and PPM are not indicated.
Discharge	All of the following: • No primary PPM indication • No new 1st degree or 2nd degree AV block • No new bundle branch block • No progression in baseline 1st, 2nd degree AV block or prolongation of the QRS ≥10%	→	Patient can be considered for early discharge.
	If any of the above are present	→	Telemetry until conduction is stable for ≥48 hours; discharge with an outpatient monitor for ≥14 days.
Outpatient Monitoring	New rhythm disturbance (e.g., atrial fibrillation) ***OR*** Progression of baseline conduction disturbance ***OR*** For whom the provider feels that monitoring is warranted	→	• Discharge with a monitor for a minimum of 14 days. • Care teams should be resourced to manage outpatient monitoring to identify progressive rhythm issues in a timely manner. • Use monitoring system that is accurate, enables adherence, notifies care team in a timely manner.*

AEM = ambulatory event monitoring; AV = atrioventricular; DH-AVB = delayed high-grade atrioventricular block; ECG = electrocardiogram; EP = electrophysiology; PPM = permanent pacemaker; TAVR = transcatheter aortic valve replacement

*The monitor should have the capacity to notify care teams quickly in the event of DH-AVB. An AEM or implantable loop recorder would suffice provided it has these attributes.

Reference: Lilly S, Deshmukh AJ, Epstein AE, Ricciardi MJ, Shreenivas S, Velagapudi P, Wyman JF. 2020 ACC Expert Consensus Decision Pathway on Management of Conduction Disturbances in Patients Undergoing Transcatheter Aortic Valve Replacement: a report of the American College of Cardiology Solution Set Oversight Committee. J Am Coll Cardiol 2020;XX:XXX-XX.

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